

COMMERCIAL FISHERIES REVIEW

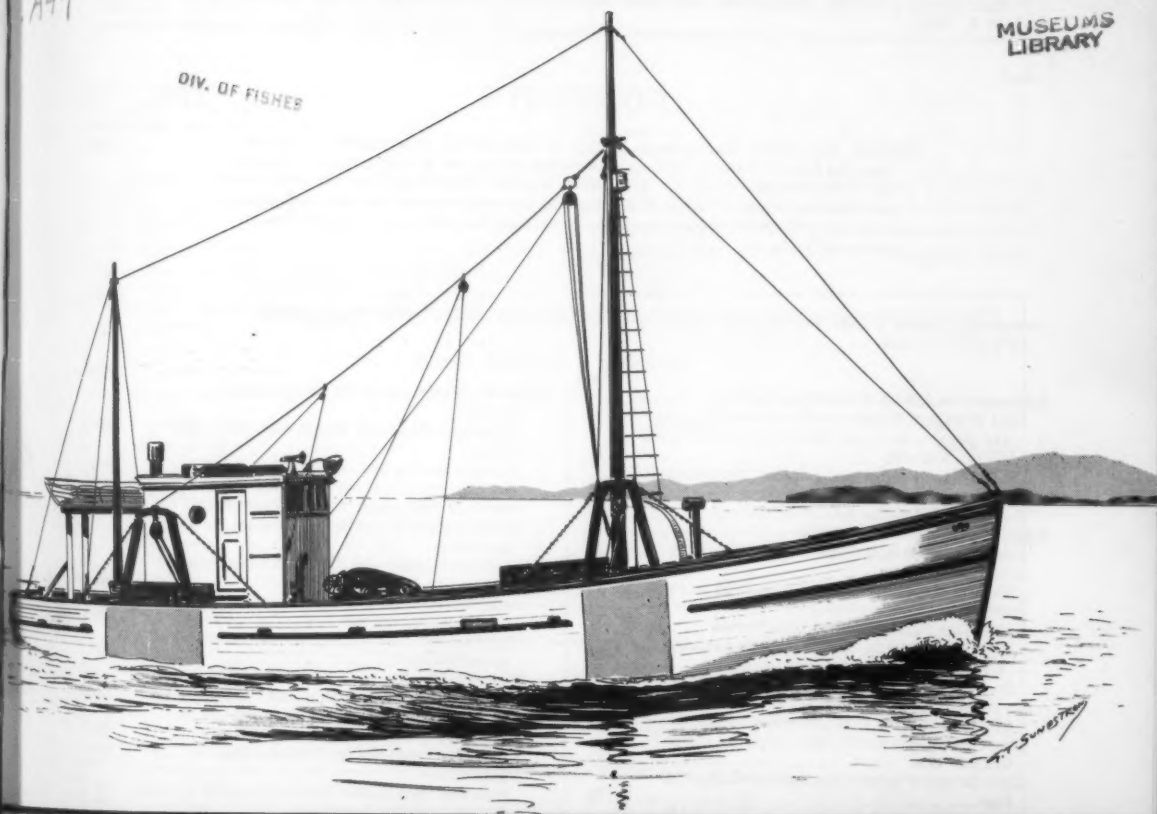
DRAGGER

ATLANTIC COAST

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Vol. 17, No. 12

DECEMBER 1955

FISH and WILDLIFE SERVICE
United States Department of the Interior
Washington, D.C.



COMMERCIAL FISHERIES REVIEW

A review of developments and news of the fishery industries
prepared in the BRANCH OF COMMERCIAL FISHERIES

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Mailed free to members of the fishery and allied industries. Address correspondence and requests to the: Director, Fish and Wildlife Service, U. S. Department of the Interior, Washington 25, D. C.

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The printing of this publication has been approved by the Director of the Bureau of the Budget, August 2, 1955. (8/31/57)

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COVER: The Atlantic Coast dragger (small- or medium-size otter trawler) is common along the Atlantic Coast from Virginia to Maine. This type of craft is usually powered with a Diesel engine of 100-300 hp., carries a crew of from 2-10 fishermen, and is at sea from 1 to 8 days. Vessels of this type catch a large share of the whiting, flounders, scup, noncommercial species, and also sea scallops that are landed at United States east coast ports.

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CONSTRUCTION DETAILS OF IMPROVED TUNA LONG-LINE GEAR USED BY PACIFIC OCEANIC FISHERY INVESTIGATIONS

By Herbert J. Mann*

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This report is a description of the latest type of fiber long-line gear now being used by Pacific Oceanic Fishery Investigations (POFI) to capture tunas in the central Pacific. It is a revision of an earlier report (Niska 1953) and contains a complete description of the gear and its use, with particular attention to changes made since the earlier report was issued.

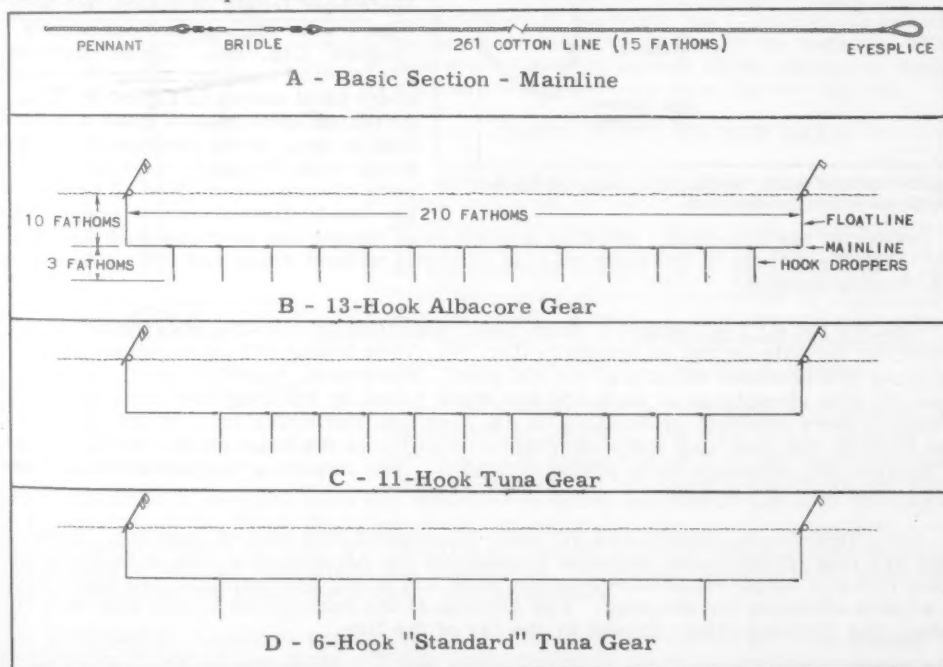


Fig. 1 - Three types of POFI long-line gear, and the basic component of their mainlines. A - 15-fathom section used in making up mainlines. B - 13-hook basket (unit) designed for albacore fishing. C - 11-hook basket used in fishing for larger tunas, such as yellowfin and big-eyed tuna. D - 6-hook "Standard" basket used in most of POFI's experimental fishing.

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The original POFI tuna long-line gear was derived from designs employed by Japanese and Hawaiian fishermen. A general discussion of the history, fabrication, and operation of such gear is included in reports by Shapiro (1950), June (1950), Murphy and Shomura (1953), and Niska (1953). So many changes have been made in the design of the gear since 1953 that a new account is necessary to acquaint the fishing industry with the successful innovations. It should be noted that the dimensions and basic design of the gear have not been changed; however, several modifications have increased the speed of setting and hauling and have resulted in greater flexibility. Each of these changes has been tested in the field under controlled conditions. The results of these field tests are discussed in Murphy and Shomura (1953), and Shomura and Murphy.^{1/}

GENERAL DESCRIPTION

The basic unit of the long line is the "basket" or "skate" (fig. 1), a 210-fathom length of mainline with droppers and buoyline, stored in a canvas skid or a bamboo basket. In the POFI experimental fishing operations about 60 such baskets are joined together to make a day's set. Since they are identical in design, plans of only one basket are shown in the diagram.

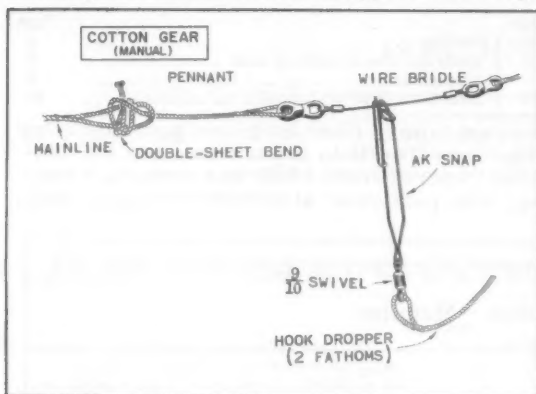


Fig. 2 - Method of joining two mainline sections, and details of wire bridle and branch-line attachment.

MAINLINE: The mainline of each basket is made up of 14 similar sections, each consisting of a 15-fathom length of cotton line with wire bridle and a short pennant or "pigtail" (fig. 1A). These sections are knotted together using the double sheet bend shown in figure 2. The principal advantage of such a system is that, since each section bears a one-hook dropper, various numbers of hooks from 1 to 13 per basket can be fished without resplicing

or reworking the mainline. Another advantage of joining the sections with knots is that tangled sections of mainline may be removed without delay and set aside as the gear comes aboard.

DROPPER ATTACHMENT: Each basic mainline section has a swiveled wire bridle for the attachment of droppers (fig. 2). This fitting has eliminated one of the most troublesome defects of the old gear. Formerly, mainline sections were made up with eyesplices at each end and were joined by knotting the loops together; droppers were attached by clipping an AK snap into one eyesplice. When the gear was hauled, the incoming mainline rotated because of the twist developed by the lay of the line and droppers were wound around it. The resulting tangles seriously delayed recovery of the gear.

The wire-bridle system has virtually eliminated this type of tangling. Droppers are now joined to the mainline by clipping the AK snap over the wire bridle. Since there is ample clearance between wire and snap, the mainline can rotate freely without affecting the dropper. The swivels at the ends of the bridle also help to reduce the twisting effect caused by the lay of the line.

HOOK DROPPERS: The 10-fathom and 5-fathom hook droppers, or branch lines (gangions), have been cut to 3 fathoms (over-all length, including leader) and the

^{1/} Long-line fishing for deep-swimming tunas in the central Pacific, 1953. U. S. Fish and Wildlife Service, Spec. Sci. Rep.: Fish, No. 157.

costly sekiyama^{2/} has been eliminated as unnecessary. The 3-fathom length marks the shortest length that can be efficiently fished; 2-fathom droppers have been tried but proved harder to coil and were more hazardous in setting and hauling than the 3-fathom type. Construction of droppers is shown in figures 2 and 3.

FLOATLINES: Floatlines, which join buoys and mainline, are made up of 5-fathom sections. The sections have an eyesplice at one end so that they may be joined by a double sheet bend. The depth of the mainline is varied by adding or removing sections without cutting or splicing line. Floatlines are joined to the mainline by the AK snap and knot shown in figure 4. Attempts have been made to use a wire bridle similar to the one used for the attachment for hook droppers, but the snaps opened up and this arrangement was discarded.

BUOY LIGHTS: Hauling operations may sometimes last until after dark, so battery-powered buoy lights are usually attached to the end poles and to several intermediate poles of the set. A typical light installation is shown in figure 5.

LONG-LINE CONTAINER: POFI long-line gear was originally stored in the standard bamboo basket commonly used in the Hawaiian and Japanese fisheries. This method of stowage was objectionable because of the space taken up by the empty baskets. POFI now stores gear in canvas skids similar to those used in the halibut long-line fishery (fig. 6).

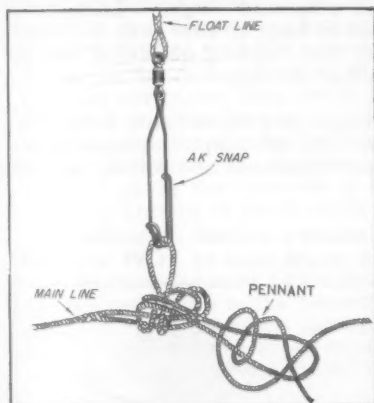


Fig. 4 - Attachment of floatline to mainline at junction of two skates.

reels; the ends of several lines are attached by brass swivels to the rear bumper of a jeep so that the lines can rotate freely to remove kinks; the lines are then unreel and stretched out over a measured 15-fathom distance and a steady strain of 125 pounds is exerted until kinks are eliminated. A Dillion dynamometer is used to check tension on the lines and prevent overstretching.

MAINLINE: Cut lines are coiled down in sets of 14 pieces each, the number required to make up one skate. These basic mainline sections are then completed by splicing in eyes, wire bridles, and pennants as shown in the diagram (fig. 1A). The end pennant of each basket is made from $\frac{1}{4}$ -inch cotton rope rather than 261-thread line and the end eyesplice is lengthened.

^{2/} Sekiyama or shanawa--a stiff pennant consisting of a linen or wire core served with cotton twine, used by Japanese and Hawaiian fishermen to connect the wire leader to the cotton branch line, and formerly employed in POFI long-lines.

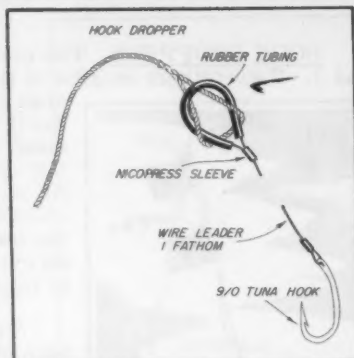


Fig. 3 - Details of branch line, leader, and hook assembly.

FABRICATION OF THE GEAR

PREPARATION OF LINE: Mainline, floatlines, and hook droppers are made of best grade hard-laid 261-thread cotton twine. Since the gear remains wet for long periods at sea, the line must be treated with some type of preservative. A commercial copper-base preservative is commonly used by POFI. Skeins of new line are cold-dipped for a period of three minutes in a full-strength solution and are then dried in the shade.

The treated line is then stretched and cut into 15-fathom lengths. To save time, several lines are cut simultaneously in the following fashion: skeins are opened out and placed on vertical

Wire bridles 6 inches long are fashioned from $\frac{5}{64}$ -inch 1 x 7 stainless wire rope. No. 2 Seadog swivels are fastened to the wire by means of Nicopress fittings (fig. 2).

HOOK DROPPERS: The construction of hook droppers is shown in figures 2 and 3. Two-fathom lengths of treated 261-thread line are made up with a special snap at the upper end. This snap, a model used by the Northwest trolling boats, is a No. 9/0 Kolstrand AK snap, but is constructed of heavy No. 7 wire and has a jaw opening of $\frac{1}{8}$ -inch diameter. It is important that the AK snap be designed to fit the wire bridle with a small clearance, since otherwise the snap is apt to jam against the swivel. The lower end of the dropper terminates in an eyesplice to which is joined hook and leader, as shown in figure 3.

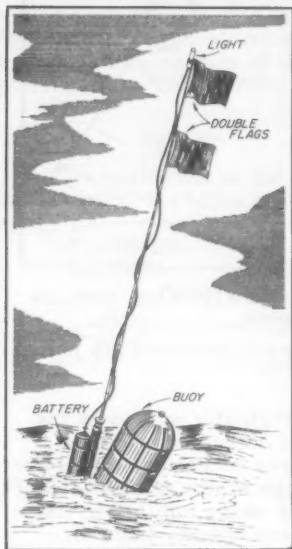


Fig. 5 - Battery-powered light buoy.

The leaders are fashioned of 6-foot lengths of .066-inch diameter right lay 1 x 7 galvanized plow-steel wire. Galvanized wire is used rather than stainless steel since it reduces the electrolytic action between hook and leader. Stainless steel leaders destroy hook plating in a very short time. A 3-inch loop in the end of the leader is fitted with a section of $\frac{3}{4}$ -inch O.D. x $\frac{1}{4}$ -inch I.D. industrial rubber tubing, which serves to prevent chafe. A 9/0 or 8/0 tuna hook is attached to the leader by a 1-inch loop fastened with a Nicopress sleeve (fig. 3). It should be noted that the hook is of a special shape, with a bent shank which allows the bait to hang in line with the leader. Such a hook has better fish-holding qualities than the conventional straight-shanked models.

FLOATLINES: Floatlines are made from 5-fathom lengths of 261-thread line. An AK snap is spliced into one end and an eye formed in the other. Mainline and floatlines are joined as shown in figure 4.

FLOATS: Floats used in the Hawaiian fishing industry include glass balls, wood billets, and metal tanks of various sizes. The floats used by POFI are made from surplus stainless-steel oxygen tanks of 2,100 cubic inches internal volume (figs. 7 and 8). These are fitted with a $\frac{3}{8}$ -inch galvanized eye bolt for attachment of a floatline. Since the tank comes provided with a $\frac{1}{4}$ -inch outlet, it is necessary to reduce this opening by fitting a $\frac{1}{8}$ -inch to $\frac{1}{4}$ -inch hex-head pipe bushing between tank and bolt. An 8-inch grommet of $\frac{3}{8}$ -inch diameter manila rope is spliced into the eye for attachment of the bamboo pole. A $\frac{3}{8}$ -inch stainless-steel thimble protects the grommet against chafe (fig. 8). Buoys are painted a bright orange for greater visibility.

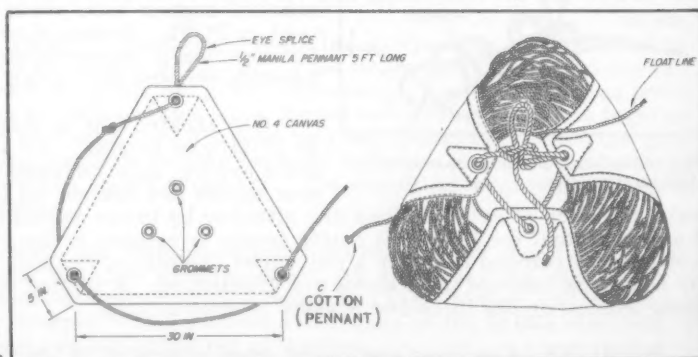


Fig. 6 - Canvas skid for stowing long-line skates.

FLAGPOLES: Alternate buoys have poles with flags to serve as markers in locating gear (fig. 7). Poles are select bamboo 14 to 16 feet in length with a butt diameter of $1\frac{1}{4}$ inches to $1\frac{1}{2}$ inches and a tip diameter of about $\frac{5}{8}$ -inch.

The poles are protected from chafing on the floats by a 15-inch section of heavy air hose. Split lengths of hose are clamped on the pole with a lower end 6 feet 6 inches from the butt. Clamps are $\frac{3}{8}$ -inch Band-It straps secured with the buckles fixed over the cut. This attachment is made so that the buckles are turned away from the buoy, presenting only the smooth band to minimize chafing.

A 5-inch loop of $\frac{3}{8}$ -inch manila line is fastened at the bottom of the pole for attaching the floatline. This loop is held in place as follows: a rosette is made in each end of the line and a Band-It strap is clamped midway on the rosette, which serves as a cushion preventing the loop from slipping under the band. The ridge at the lower joint of the pole tends to prevent the loop and band from slipping off the butt of the flagpole.

The float is tied to the flagpole by a 4-foot lanyard of $\frac{3}{8}$ -inch manila line, which is secured to the flagpole just below the chafing gear. The end of the lanyard next to the pole ends in an eyesplice, as shown in figure 8. A safety line of 261-thread cotton line runs from this eye to the bottom of the pole, where it is made fast to the manila loop. If the bamboo pole breaks during fishing operations, the safety line prevents loss of buoy and floatline. On setting the gear, the free end of the lanyard is joined to the grommet of the float by a reverse sheet bend with bow (fig. 8).

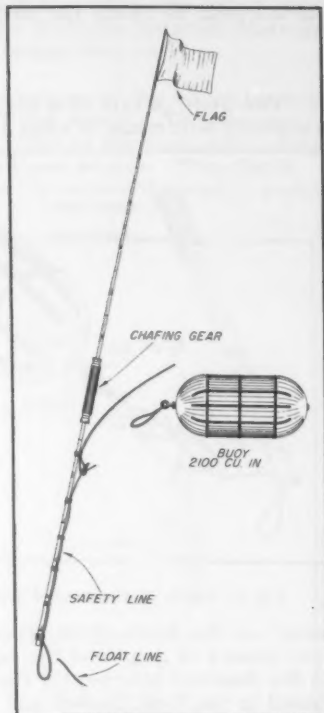


Fig. 7 - Complete flag and float assembly, showing chafing gear.

Bunting flags are attached to the top of the flagpoles by waxed, doubled, cotton-thread ties fixed to the corners of the flags. POFI flags are dyed a bright orange since this color seems to show up well under all sea conditions. The size of flags has been increased to $1\frac{1}{2}$ square feet in an effort to increase the range of visibility. Double flags are used to mark various portions of the set such as the ends and center.

CANVAS SKID: To make the skid (fig. 6), No. 4 canvas duck is cut in the shape of an equilateral triangle 45 inches on a side. Corners are turned in with No. 5 grommets punched in the center. A $\frac{3}{8}$ -inch manila becket, 60 inches long, is laced through the grommets. A 3-inch loop is spliced on one end, and the standing end is securely whipped. The loop is secured on one grommet by an overhand knot immediately behind the eyesplice. With the line in place the standing end is laced through the other two grommets and passed through the eye to form a bight. A slip knot finally secures the line. Skids have brass grommets in the bottom to provide proper drainage and ventilation of wet line.

ASSEMBLING LINES FOR SETTING

Prior to setting, mainline and branch lines are assembled and the gear is carefully coiled down on the skid. The bottom end pennant is left exposed for joining to

the next basket (fig. 6). Hook-dropper coils are made up smaller than mainline coils and are secured by hooking the tuna hook into the rubber chafing gear on the wire leader. The floatline is coiled down on top of the pile, the skid is then tied up, and the gear is ready for setting.

SETTING

The gear is laid in a straight line and in a direction relative to the wind and sea which will make it easy to haul the line. Hauling is easiest when the wind blows

from about 30° off the bow on the side of the line hauler. Therefore, gear is usually laid with the wind about 30° off the stern opposite from the line hauler. When course is reversed to pick up the gear, if no wind shift has occurred, the winch side will be the weather side and wind and sea will be broad on the bow.

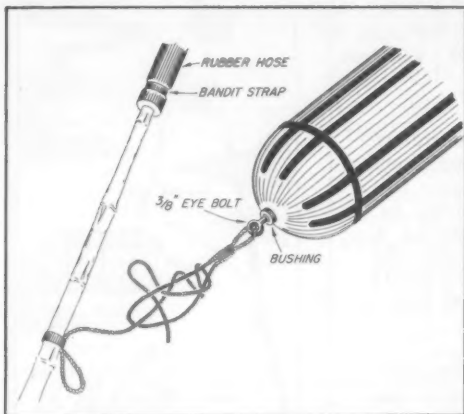


Fig. 8 - Details of attachment of float to flagpole.

Setting is usually done from a "setting table" on the stern of the vessel. This is a wooden bench large enough to hold several skates of gear and the bait needed for the set. In setting (1) the vessel is put on the desired course; (2) floatline, buoy, and flagpole (usually with double flag) are joined to the first basket and pitched overboard; (3) one fisherman pays out coils of mainline while others uncoil droppers and bait hooks.

The amount of slack in the mainline, and consequently the fishing depth of the gear, is controlled by the fisherman throwing out the mainline coils. These may be thrown out rapidly to give a "slack set" which fishes at a comparatively great depth, or they may be held until the line is stretched out taut by the vessel, which results in a comparatively shallow fishing depth. A slack set may also be accomplished by steering a zigzag course while paying out the line.

HAULING

LONG-LINE HAULER: The gear is hauled with a Japanese line hauler of the type shown in figure 9. Such a winch is used in preference to an ordinary gurdy because it coils down the mainline automatically with little attention from the winch operator.

The coiling of the line is accomplished by the hauling head shown at the top of the winch. This assembly consists of a split sheave (A) grooved to fit the diameter of the line to be hauled; a wide center wheel with replaceable rubber collar (B); and a movable brass idler (C) controlled by the lever at the left. All three units are connected by a gear train which synchronizes them when they are turned by the drive shaft in the base of the winch.

In hauling, the incoming line is led under the grooved sheave, then over the center wheel and between it and the brass idler. The grooved sheave grips the line

and the idler squeezes it against the rubber collar giving friction to pull the line in as the sheaves rotate.

The line is deflected downward by the brass plate (D) to a platform below, where it coils itself. The size of the coil is dependent upon the distance between plate and platform, so it is necessary to adjust the height of the latter with care.

The hauling head is turned by the drive shaft at the bottom of the winch through a multiplate oil-bathed disc clutch located in the base of the winch. The foot-operated clutch control is mounted near the ship's bulwark close to the overside roller so that the winch operator can see the incoming branch lines easily. The clutch control is so arranged that the winch operates continuously unless the clutch pedal is depressed.

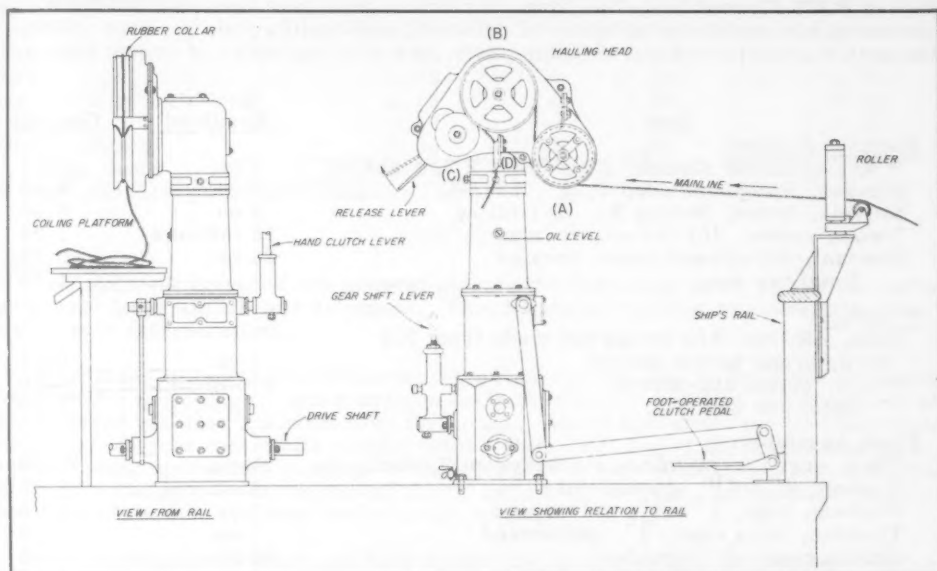


Fig. 9 - Japanese long-line hauler.

The gear-shift lever shown at the lower left controls the hauling speed. With a drive shaft input speed of 300 r.p.m., high gear yields a line speed of about 1,000 ft./min., low gear a speed of 500 ft./min.

Hawaiian and Japanese fishing vessels frequently drive line haulers with a line shaft take-off from the main engine. On POFI vessels an electric drive (3 hp. waterproof motor d.c. 1,725 r.p.m.) and a 5:1 gear reduction, or a hydraulic drive (7.5 hp. 35.8 gal./min. pump at 1,200 r.p.m.) are used to power haulers.

HAULING PROCEDURE: Hauling operations on Japanese vessels have been described by Shapiro (1950) and Shimada (1951). On POFI vessels the mainline is brought aboard, led through the overside rollers, and fed into the line hauler. The winch is controlled by the clutch operator, who stands at the rail and stops the winch by the foot control to detach branch lines. The fisherman tending and coiling line can also stop the hauling by pulling back on the idler lever, thus releasing tension on the line. Floatlines and hook droppers are detached as they reach the overside roller. The buoys and flagpoles are untied and stowed, and the floatlines and droppers are coiled by hand. As the mainline coils under the line hauler, floatlines and

droppers previously coiled by hand are reattached in the proper places so that the "basket" is ready for use the following day.

If the gear is not to be used for some time, as for example, when the vessel changes fishing grounds, droppers are removed from the mainline and are stowed separately. If practicable, hooks and leaders are removed from the droppers, for if assembled gear is stored wet for long periods, metallic components react with the damp line to cause weak spots. Gear is dried whenever possible, but exposure to direct sunlight is avoided.

MATERIALS USED TO MAKE UP GEAR

The following list of materials contains the items necessary to make up one basket of POFI 11-hook long-line gear. Prices of gear have been derived from Government bid quotations on material delivered in Honolulu and, because of fluctuations in market prices and shipping costs, are only estimates of cost to others.

	Item	Quantity Required	Cost (\$)
1.	<u>Mainline Section:</u>		
	Wire, stainless steel $\frac{5}{8}$ " diameter 1 x 7, right lay	6 in.	0.03
	Sleeves, Nicopress copper, $\frac{1}{16}$ ", 18-1-C	2 ea.	0.08
	Swivels, brass, Seadog No. 2, trolling	2 ea.	0.46
	Twine, cotton, 261-thread, treated	15 fathoms	1.25
	Pennant, 261-thread twine, treated	24 in.	0.03
	Total per unit		1.85
2.	<u>Floatline:</u>		
	Snap, AK, No. 9/0 design but made from 7/0		
	wire, brass barrel swivel	1 ea.	0.35
	Twine, cotton 261-thread	10 fathoms	0.90
	Total per unit		1.25
3.	<u>Float Assembly:</u>		
	Tank, surplus, stainless steel oxygen, 2,100 cu. in.	1 ea.	10.40
	Eyebolt, $\frac{3}{8}$ " x $4\frac{1}{2}$ ", galvanized	1 ea.	0.55
	Bushing, pipe, $\frac{1}{4}$ " - $\frac{1}{8}$ ", galvanized	1 ea.	0.16
	Thimble, wire rope, $\frac{3}{8}$ ", galvanized	1 ea.	0.10
	Manila rope, $\frac{3}{8}$ " diameter	24 in.	0.05
	Sealing compound, lashing twine	-	0.10
	Paint, Westinghouse, orange enamel	$\frac{1}{2}$ pt.	0.40
	Total per unit		11.76
4.	<u>Bamboo Pole Assembly:</u>		
	Pole, bamboo, 14" long x $1\frac{1}{2}$ " at base	1 ea.	0.70
	Flag, bunting, 14" x 18", orange	1 ea.	0.24
	Hose, air, surplus, heavy	14 in.	0.80
	Strapping, Band-It, $\frac{3}{8}$ " width	18 in.	0.09
	Buckles, Band-It, $\frac{3}{8}$ " width	3 ea.	0.18
	Rope, Manila, $\frac{3}{8}$ " diameter	6 ft.	0.15
	Total per unit		2.16
5.	<u>Hook Dropper:</u>		
	Snap, AK, 9/0 formed of 7/0 wire with brass		
	barrel swivel	1 ea.	0.35
	Twine, cotton, 261-thread	12 ft.	0.18
	Tubing, rubber, black industrial, $\frac{3}{8}$ " O.D. x $\frac{1}{8}$ " I.D.	6 in.	0.08
	Sleeves, Nicopress, $\frac{1}{16}$ "	2 ea.	0.08
	Wire rope, leader, .066" dia. 1 x 7 right lay		
	plow steel, galvanized	6 ft.	0.06
	Hook, 9/0 or 8/0 mustad flatted tinned, tuna	1 ea.	0.18
	Total per unit		0.93

Item	Quantity Required	Cost (\$)
6. Skid:		
Canvas, No. 4, triangle 45" each side	1 ea.	1.03
Manila rope, $\frac{1}{2}$ " diameter	60 in.	0.20
Spur grommet, heavy, brass	6 ea.	0.12
Total per unit		1.35

Since POFI gear can be assembled so as to fish different numbers of hook dropers, the cost of individual baskets varies according to the type of gear used. Costs of typical gear assemblies are shown below:

Components	6-Hook "Standard"	11-Hook Tuna	13-Hook Albacore
Mainline--14 sections			
basket	\$25.90	\$25.90	\$25.90
Floatline	1.25	1.25	1.25
Buoy	11.76	11.76	11.76
Bamboo pole ^{1/}	2.16	2.16	2.16
Droppers	5.58	10.23	12.09
Canvas skid	1.35	1.35	1.35
Total Skate	\$48.00	\$52.65	\$54.51

^{1/} Bamboo poles are usually attached to alternate buoys only.

DISCUSSION

The greatest defect of the present gear is the relatively short life of the cotton twine used for mainline and droppers. Three factors combine to cause this relatively rapid deterioration.

First, due to conditions inherent in the fishery, the line is often overstrained. This method of fishing is necessarily nonselective as far as catch is concerned, and large sharks and marlins often take the hooks. Heavy fish chafe the line and sometimes stretch gear beyond its elastic limit. Overstraining of the line also occurs during fishing operations in rough weather, for it is then difficult to keep the vessel close up to the gear. As the vessel drifts away from the set, the mainline is sometimes parted before the ship can recover position.

A second factor is wear and tear on the line during hauling operations. Some abrasion is due to chafing of hooked fish when droppers tangle with the mainline, but most of the damage is done by wear on the line as it passes over the rollers and through the line hauler. Wear is especially evident where swivels are inserted in the line.

Finally, the line deteriorates because proper care of the gear is extremely difficult. While on the fishing grounds, gear is set during the day and stored damp at night in the skids; it is frequently stored damp for several days at a time while the vessel changes fishing grounds. Under such conditions cotton line loses strength rapidly. It has been possible to make some progress in methods of preserving gear. For instance, POFI gear treated with copper-naphtenate preservatives now lasts about twice as long as the tan bark-treated line used in the Hawaiian fishery. Tarred line used exclusively by the industry in Japan and to some extent in Hawaii is now being tested but has not yet been evaluated.

It should be pointed out that the gear described in this report has not been designed primarily for commercial use. Rather, an effort has been made to develop a type of gear which would be extremely flexible and which could be changed rapidly for various types of experimental fishing. During the evolution of this gear, several design limits appear to have been reached. Thirteen hooks per basket appear to be the maximum number practicable with this type of gear. As many as 21 hooks per

basket have been fished, but the net result was a slowing down and a reduction of efficiency in both setting and recovery of the gear. Hook droppers also have been shortened to their minimum length. Thus, it is anticipated that the general design of the gear may remain unchanged for some time but that further improvements may well be made in the speed with which the gear is operated and the durability of the materials from which it is constructed.

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HE SHOWED OYSTERS HOW TO PRODUCE PEARLS

Kokichi Mikimoto--the man who developed the art of inducing reluctant oysters to produce pearls, built it into a major industry with world-wide connections, and himself made a fortune from it--died in Japan in September 1954 at the age of 96.

Mikimoto set up in business about 1905, after 15 years of experimentation. So far no one seems to have succeeded in imitating his enterprise on a commercial scale.

His pearls have been wrongly called artificial. All pearls are in unnatural development in an oyster, but, for a chemical aspect, Mikimoto's products are in every sense natural pearls. Even the seed on which the oyster built was a pearl, not a grain of sand as has so often been stated. These seed pearls are usually imported from the United States where they are obtained from small shellfish in the Mississippi and other rivers.

A pearl's value depends largely on its luster, and luster depends on the chemical constituents of the water in which it is produced. Mikimoto's pearls are thus, in this respect, equal to the best Japanese uncultured pearls. However, cultured pearls, produced in the Persian Gulf, an area noted for its beautiful pearls, might be superior in luster to Mikimoto's. The same may be true of pearls cultured at Thursday Island.

The secret, or art, is the highly skilled job of correctly placing the seed pearl in the oyster without killing the oyster.

One of the war reparations Australia gained from Japan was the secret of this artificial pearl culture. It is one thing to explain the process or to put it down on paper and another to develop the skills required--as the Australian CSIRO has discovered at its Thursday Island experimental station in postwar years. The CSIRO's fishery research officer at Sydney said in September 1954 that no great effort had been made at Thursday Island. The experiments were being conducted more or less as a side line

--Pacific Islands Monthly, November 1954



COLD STORAGE OF FROZEN PACIFIC OYSTERS (*CRASSOSTREA GIGAS*) - NO. 1^{1/}

BACKGROUND

Very little information is available on the factors that determine the storage life of frozen oysters. The development of a frozen oyster product with characteristics comparable to those of the fresh product would be of economic value to the oyster industry. Increased acceptance of frozen oysters would result in a larger market and wider distribution.

Certain problems exist in regard to the successful freezing and storage of oysters. These include the formation of excessive "drip" (free liquor in thawed oysters after freezing), and the development of off-flavors, discoloration, and texture changes during storage. The current investigation is to determine the relative importance of these changes and to find practical methods of eliminating or minimizing them.

Members of the oyster industry are also interested in new methods of preparing oysters for the market. Recently there has been considerable activity in the field of specialty products, including canned and frozen oyster stew, and breaded and fried oyster products. Successful development and promotion of these products would give a boost to the industry.

This project was started in October 1954. As with all new projects, sometime was spent by the researchers in becoming familiar with the problems involved, making a study of the literature, and developing techniques.

Laboratory work consisted of (1) a preliminary investigation into factors that may contribute to the formation of drip, (2) a study of the possible value of treating oysters with certain antioxidants, and (3) the development of special techniques for improving the quality of frozen breaded and fried oysters.

STUDIES ON DRIP

Studies by Lanham, Kerr, and Pottinger (1948) with oysters from the Chesapeake Bay area showed that the amount of "bleeding" or free liquor exuded by oysters after they are shucked varies with the season, method of cleaning, location of the oyster beds, and other similar factors. When frozen oysters are thawed, the quantity of drip will vary considerably with the method of thawing and the method and time of draining.

In the present work on Pacific oysters, investigations of factors affecting drip included a study of (a) the effect of damage to the oyster meats during shucking, (b) the effect of holding the shucked oysters before freezing, (c) the effect of blowing time or washing of shucked oysters, and (d) the effect of temperature and time of thawing on the amount of drip developed.

^{1/} This work was carried out under a project financed in part by The Refrigeration Research Foundation.

The method used to determine drip is an adaptation of the Association of Official Agricultural Chemists (1950) procedure for raw shucked oysters and of the

Table 1 - Effect of Damage During Shucking on the Amount of Drip Formed on Thawing of Frozen Pacific Oysters

Condition of Oysters	Can Number	Drip	
		Initial ^{1/} Percent	Final ^{2/} Percent
Undamaged	1	2.55	3.72
	2	3.35	4.60
	3	1.77	2.81
	4	2.44	3.64
	5	0.65	1.09
	6	1.05	1.82
	7	2.46	3.72
	Average	2.04	3.06
Damaged (Cut or broken)	11	2.92	4.65
	12	2.19	4.54
	13	1.88	3.76
	14	1.01	2.26
	Average	2.00	3.80

^{1/} After draining for 2 minutes.

^{2/} Additional drip due to standing an hour at room temperature and being drained for another two minutes.

method used by Lanham et al. with Chesapeake Bay oysters. The shucked Pacific oysters, packed in hermetically-sealed cans, were thawed overnight at 34° F. and were then placed in running tap water (54° ± 2° F.) for 30 minutes. The cans of oysters were then weighed and opened, and the oysters were placed on a No. 4 sieve (4 meshes per inch; 0.185-inch opening), drained for 2 minutes, returned to the can, and reweighed. The percentage drip was calculated from the weight lost during draining.

EFFECT OF DAMAGE:

During shucking, the damaged (cut or broken) oysters were placed in a separate group from the undamaged ones. The

two groups were washed, packed in half-pound cans, frozen, stored for 3 days, thawed, and drained on a sieve, as previously described. After being drained and weighed, they were allowed to stand covered for an additional hour at room temperature in order to determine the effect of standing. The oysters were then drained for an additional 2 minutes and reweighed to determine any further loss in weight. The data (table 1) show no significant difference in the amount of thawed drip from the damaged and the undamaged oysters. More data are necessary, however, before a final conclusion can be drawn as to the effect of damage to oyster meats on the amount of drip formed.

EFFECT OF HOLDING BEFORE FREEZING: Some oysters are frozen immediately after shucking; others are held at refrigerated temperatures for several days before freezing. Preliminary experiments indicated that, at least in some cases, considerable drip forms in iced shucked oysters even before freezing. This point is being further investigated.

EFFECT OF BLOWING TIME: Pacific oysters are washed by bubbling air through them while they are suspended in water. This operation is known as blowing. Some experiments were carried out to determine the effect of blowing upon drip formation in the subsequently frozen oysters.

Blowing time was varied from 0 to 30 minutes, using 7 groups of oysters from the same batch. The blown oysters were packed in $\frac{1}{2}$ -pound cans hermetically sealed at 18 to 20 inches of vacuum, and frozen at -20° F. They were then transferred to 0° F. for a short period of storage.

Table 2 - Effect of Blowing Time on the Amount of Drip Formed in Frozen Pacific Oysters on Thawing

Blowing Time in Fresh Water	Drip	Moisture ^{2/}
Minutes	Percent	Percent
^{1/} 0	1.00	77.25
2 $\frac{1}{2}$	1.72	78.00
5	2.65	78.30
7	2.28	78.60
10	2.22	79.26
15	4.28	79.98
30	3.71	79.53

^{1/} Control group.

^{2/} Moisture content of oysters, after removal of drip, using Brabender Moisture Tester.

The average amount of drip was calculated for each group, and the moisture content of the drained oysters was determined by the use of a Brabender Moisture Tester. The drip and moisture content showed a general tendency to vary directly with the blowing time (table 2). More data are needed to verify these findings.

EFFECT OF THAWING TEMPERATURE AND TIME: Studies were carried out to determine if differences in thawing time or temperature affect the amount of drip formed. Two experiments were made: series I, experimentally-handled oysters; and series II, commercially-handled oysters.

In series I, shucked Pacific oysters purchased in $\frac{1}{2}$ -gallon cans in Seattle and transported to the Service's laboratory were sorted, and the undamaged oysters were repacked in $\frac{1}{2}$ -pound cans; they were then hermetically sealed, frozen at -20°F. , and stored for 3 days at 0°F. The frozen oysters were divided into 5 groups of 6

Table 3 - Effect of Thawing Time and Thawing Temperature on the Amount of Drip Formed in Frozen Pacific Oysters Upon Thawing

Thawing Temperature Degrees F.	Thawing Method	Thawing Time Hours	Drip Percent	Moisture ^{1/} Percent
Series I - Experimentally-Handled Oysters				
34	Still air	42	3.21	78.87
48-52	Still air	25	2.52	78.53
65-70	Air with fan	2 $\frac{1}{2}$	2.72	77.70
45-47	Water	4	2.79	78.10
110	Water	2 $\frac{2}{3}$	3.16	77.90
Series II - Commercially-Handled Oysters				
34	Still air	29	7.78	76.75
48-52	Still air	24	8.16	75.65
65-70	Air with fan	3 $\frac{1}{2}$	7.92	76.10
47	Water	4 $\frac{1}{2}$	6.81	76.00
110	Water	1 $\frac{1}{2}$	6.72	76.00

^{1/}Moisture content of oysters after removal of drip using Brabender Moisture Tester.

cans each, and each group was thawed under one of the following sets of conditions: (a) in still air at 34°F. , (b) in still air at 48° to 52°F. , (c) in front of a fan at 65° to 70°F. , (d) in water at 45° to 47°F. , and (e) in water at 110°F.

There appeared to be no significant differences in the amount of drip formed under the various thawing conditions (table 3).

In series II, 10-ounce cans of commercially-frozen oysters that had been in storage at 10°F. for approximately 9 months were used. These oysters were divided into similar groups and thawed under the same conditions as those in series I.

In this series, there also appeared to be no significant differences in the amount of drip formed under the various thawing conditions (table 3).

The commercially-frozen oysters (series II) gave considerably more drip than did the experimentally-frozen oysters (series I). This difference in amount of drip is probably due to the longer time that the commercial oysters had been in cold storage.

USE OF ANTIOXIDANTS

An exploratory series of samples designed to determine the possible value of certain compounds for improving the color and flavor of frozen oysters were placed in storage. The seven variants used are listed on the following page:

Treatment:

- (1) None
 - (2) Blanched
 - (3) 1-percent ascorbic acid
 - (4) 1-percent ascorbic-citric acid (8-percent ascorbic : 92-percent citric)
 - (5) 0.05-percent NDGA-BHA mixture
 - (6) 0.05-percent NDGA-BHA mixture in gelatine (1 tablespoon dry gelatine : 1 pint water)
 - (7) Gelatine in water (1 tablespoon gelatine : 1 pint water)
- 1/10-percent nordihydroguaiaretic acid : 20-percent butylated hydroxyanisole : 64-percent propylene glycol : citric acid (percentage of citric acid is not known).

The samples were sealed in half-pound cans, half of which were evacuated. These samples have been in storage too short a time to show any trends. If any of the treatments show promise, an extensive series will be prepared for storage.

SPECIALTY PRODUCTS

Breaded raw oysters freeze together and must be thawed in order to be separated before being fried. If a method could be devised by which this freezing together could be avoided, the product would be much more convenient for use.

There are several possible approaches to the problem, including (a) treatment to firm the oyster meats or (b) coating the breaded product before packaging. Some exploratory work has been done using these two approaches to the problem, but no results are available as yet.

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OIL RESEARCH PROJECT AT THE SEATTLE TECHNOLOGICAL LABORATORY

OBJECTIVES OF THE PROJECT: The oil research project of the Seattle laboratory is a part of the national basic research program on marine oils developed under the Saltonstall-Kennedy Act. Since the beginning of the Seattle project, a main objective has been the preparation of chemical products (i. e., chemical derivatives) by modification of the fatty-acid structures occurring in marine oils. Other objectives of the project include the determination of chemical and physical properties of the products prepared, and the development of procedures for the separation of marine-oil fatty acids and their chemical derivatives.

The need for studies of chemically-modified products lies in the fact that new and better uses for fats and oils depend largely on chemical modification. This fact is evident if one considers the economic importance to the oil industry of processes, such as catalytic hydrogenation, developed early in this century, or the more recent

production of detergents and alkyd resins. Potential developments in fats and oils through chemical modification are virtually limitless.

Although research on new products from most commercial oils is being carried on at an ever-accelerated pace, there have been relatively few publications in the chemical literature describing synthetic chemical work using marine oils as the raw material. Fortunately, there are a variety of reactions known which can be applied to fish oils, and it is the first objective of this project to select some of these reactions, apply them to fish oils, and study the properties of the products obtained.

Modification of marine oils can be brought about in two major ways: (1) by modifying the carboxylic group of the fatty acids to produce such substances as long-chain alcohols, halides, and siloxanes, (2) by oxidizing or adding chemical groups to the double bonds of the unsaturated fatty acids to produce, for example, dicarboxylic acids, poly-halides, and poly-amino acids.

A second objective of the Seattle project is to determine some of the more common chemical and physical constants of the products prepared. These constants include boiling points, melting points, refractive indices, composition, iodine values, and spectrophotometric data.

A difficulty encountered throughout the work has been the lack of samples of individual fatty acids characteristic of marine oils. The preparation of even small fatty-acid samples of a moderate degree of purity is very time consuming. Nevertheless, fairly large samples of fatty acids (in the range of 50 to 100 g.) have been needed in order to work out the difficulties encountered in the chemical reactions involved in the project. For this reason, the inexpensive and easily obtained fatty acids--stearic, palmitic, and oleic acids--have been used in the initial studies of each reaction. The use of these common fatty acids offers an additional advantage in that properties such as boiling points and refractive indices of many of their derivatives, for example, the corresponding alcohols and halides, are known. This fact is of great help to the investigator in the isolation of the reaction product and in computing yields.

After the reaction procedure has been developed to the point where a clean reaction product can be obtained in good yield, the reaction can be applied to marine-oil fatty acids and the products produced can be isolated and studied.

Since marine oils contain a wide variety of fatty acids--varying both in chain length and degree of unsaturation--it is necessary that separations should be carried out to yield pure or nearly-pure fatty acids or their chemical derivatives. In this way, the products produced will have uniform (and measurable) chemical and physical properties. Such uniformity is highly desirable if any commercial application should be attempted. Thus, a third objective of the project is to carry out separations of the marine-oil fatty acids and their derivatives by means of such techniques as vacuum distillation, fractional precipitation, and inclusion-compound formation.

EXPERIMENTAL WORK: The first group of chemical derivatives studied under this project were the long-chain alcohols. These compounds were selected because they are important both from a commercial and research viewpoint as intermediates in the production of a wide variety of other chemicals, such as detergents. There are two general methods available for converting fish oils to alcohols: sodium reduction and catalytic reduction.

Sodium reduction is applicable both to laboratory and industrial use and consequently has been the method used in this work. The procedure, essentially as described by Pryde (1951), involves the suspension of finely-divided sodium in boiling xylene. To this suspension, a mixture of the fatty acid ester (either glyceride or methyl ester), the reducing alcohol, 2-methyl, 4-pentanol, and xylene is added at a

controlled rate of flow. The reaction mixture must be well agitated so that the sodium particles can react with the fatty-acid ester and reducing alcohol. After the addition is completed, the reduction mixture is agitated at reflux temperature for an hour and is then slowly poured into a hydrolysis and steam-distillation apparatus. The long-chain alcohols are liberated from the reduction mixture by hydrolysis, and the reducing alcohol and xylene are removed by steam distillation.

The details of the sodium reduction were worked out by preparing cetyl alcohol from methyl palmitate; octadecyl alcohol from methyl stearate; and oleyl alcohol from methyl oleate. The reaction was then applied to the natural glycerides of menhaden and pilchard oils. The crude mixed alcohols were obtained in 85- to 90-per-cent yield as brown semisolid oils. They were separated into saturate and unsatu-

Table 1 - Boiling Points and Refractive Indices of Long-Chain Compounds

Compound	Boiling Point		Refractive Index	
	Temperature	Pressure	No.	Temperature
	Degrees C.	Mm. of Hg.		Degrees C.
Cetyl alcohol	187 - 191	15	1.4283	79
1-octadecanol	207 - 211	15	-	-
Oleyl alcohol	207 - 211	15	1.4607	20
Hexadecyl bromide	197 - 203	21	1.4593	20
Octadecyl bromide	213 - 216	14	1.4441	70
Oleyl bromide	142 - 147	1	1.4692	25
Octadecyl iodide	180 - 190	7	-	-
Octadecyl chloride	190 - 205	12	-	-
Oleyl chloride	190 - 202	12	-	-
Δ^8 octadecenyl trichlorosilane	166 - 167	1.5	1.4644	25
Hexadecyl trichlorosilane . . .	199 - 201	10	1.4553	27.5

rate fractions by precipitation from acetone at -18°C . These fractions at present are being separated into more refined fractions by fractional distillation and urea-inclusion compound formation. A publication describing the preparation and properties of the long-chain fatty alcohols from pilchard oil is planned in the near future.

Cetyl, octadecyl, and oleyl alcohols have been used for the preparation of the long-chain halides, another important group of intermediate organic compounds. By the use of the halides, it is possible to prepare quaternary salts, nitrites, amines, and Grignard reagents. Several different methods of converting alcohols to halides have been studied, including the use of hydrogen halide acids, thionyl chloride, and phosphorus trihalides. The latter compounds, especially phosphorus tribromide, gave the best results. It appears to be difficult to convert unsaturated alcohols to the corresponding halides, owing to the reactivity of the double bonds. However, oleyl bromide and oleyl chloride have been made, and the preparation of halides from the polyunsaturated marine-oil alcohols soon will be studied.

The long-chain halides are being used to prepare long-chain alkyl silicone polymers. In the past 20 years, a tremendous amount of work has been done on silicone polymers containing alkyl groups of one to four carbons, and such compounds have become important commercial products. However, practically no information is available concerning silicone polymers containing alkyl groups of 12 to 24 carbons and with unsaturated bonds in the alkyl chain. Since alkyl groups of these chain lengths are readily available from the fatty acids of fats and oils, a study has been started of silicone polymers containing long-chain alkyl groups.

The preparation of the cetyl silicone polymer is typical of the methods used in the work. Cetyl bromide, distilled at 197° to 203°C . / 21 mm. of mercury was reacted with magnesium in dry ether to form a Grignard reagent. The Grignard reagent was added with rapid stirring to an ethereal solution of silicon tetrachloride, precooled to 0°C . The main product from this reaction was cetyl dichlorosilane, which was distilled off. The cetyl dichlorosilane was hydrolyzed by pouring over cracked ice. After the hydrolysis was complete, the cetyl silanol, which had pre-

cipitated as a white, amorphous solid, was filtered off and dried in vacuo. The dried silanol was then polymerized by heating in a vacuum oven at 90° C. for 18 hours. This crude polymerized cetyl derivative was a tan-colored solid.

Other silicone polymers prepared in addition to the cetyl derivative include the octadecyl and oleyl derivatives.

The boiling points and refractive indices of some of the long-chain alcohols, halides, and chlorosilanes are given in table 1. The data on Δ^9 octadecenyl tri-chlorosilane has not been previously published.

The work dealing with separations of fatty acids and their derivatives has involved both conventional fractional-distillation procedures and also the newer technic based on urea-inclusion compound formation. A publication describing the work at the Seattle laboratory on the application of urea to the separation of marine-oil fatty acids recently appeared (Domart, Miyauchi, and Sumerwell 1955). A second paper on this subject will soon be ready for publication.

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FEDERAL SPECIFICATION FOR CANNED SHRIMP

Federal specification "Shrimp; Canned" (PP-S-311a) was issued by the General Services Administration on September 8, 1955. This specification was developed for the use of all Federal agencies and supersedes Interim Federal Specification PP-S-00311a issued November 18, 1954, and Federal Specification PP-S-311 issued March 31, 1931.

Single copies of the specification for bidding purposes may be obtained, without charge, from the General Services Administration Regional Offices in Boston, New York, Atlanta, Chicago, Kansas City (Mo.), Dallas, Denver, San Francisco, Los Angeles, Seattle, and Washington (D.C.) It is also sold at 10 cents a copy by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.





TRENDS AND DEVELOPMENTS

Additions to the Fleet of U. S. Fishing Vessels

A total of 22 vessels of 5 net tons and over were issued first documents as fishing craft during September 1955, according to the U. S. Bureau of Customs. This was a decrease of 27 vessels (55 percent), compared with the 49 fishing craft documented for the first time during the corresponding month of 1954.

U. S. Vessels Issued First Documents as Fishing Craft, September 1955 and Comparisons

Section	September		Jan.-Sept.		Total
	1955	1954	1955	1954	1954
	(Number)				
New England . . .	-	1	16	22	23
Middle Atlantic . .	-	1	11	14	15
Chesapeake	2	9	34	76	93
South Atlantic . . .	3	14	50	97	119
Gulf	8	11	77	283	313
Pacific	6	12	107	100	117
Great Lakes	1	-	7	3	6
Alaska	1	1	31	23	27
Hawaii	1	-	3	1	1
Puerto Rico	-	-	-	-	2
Unknown	-	-	-	1	1
Total	22	49	336	620	717

Note: Vessels have been assigned to the various sections on the basis of their home port.

During September of the current year, the Gulf area led all others with 8 newly-documented craft, followed by the Pacific area with 6, the South Atlantic area with 3, the Chesapeake area with 2, and the Great Lakes, Alaskan, and Hawaiian areas with 1 each. The New England, Middle Atlantic, and Puerto Rican areas had none.

During the nine-month period ending with September 1955, a total of 336 vessels

were documented for the first time as fishing craft, compared with 620 for the corresponding period of last year--a decrease of 46 percent.



American Samoa

EXPORTS OF CANNED TUNA AND FISH MEAL INCREASE: The increasing importance of the tuna and the fish meal industries of American Samoa is indicated by figures recently released at Pago Pago, according to the September 1955 issue of the Pacific Islands Monthly.

During fiscal year 1953/54, a total of 8,176 cases of canned tuna and 456 sacks of fish meal were exported as compared with 66,160 cases and 3,319 sacks for 1954/55. The export value for the tuna and fish meal was about \$1 million in 1954/55.

It was stated that 32 Japanese fishing vessels are supplying the tuna cannery and 300 Samoans are employed ashore. Shipping companies are pleased about the new industry. One ship picked up 18,000 cases of canned tuna in July and a second ship was reported picking up an estimated 40,000 cases in mid-August.

California

ALL-NYLON PURSE SEINE FOR TUNA VESSEL: The Anthony M, the largest known tuna purse seiner in the world and operating in the California tuna fishery, is now being equipped with an all-nylon purse seine, which is the first known tuna net of all-nylon webbing. The nylon web was manufactured by a netting company, and the price was not revealed. The net, which is approximately 450 fathoms in length, will weigh much less than one-half of the standard cotton purse seine and is completely impervious to the weather and the elements, and requires no preservative treatment, such as tar or chemical net dips. The Anthony M is also being equipped with a new light-weight "Puretic Power Block," for hauling the net aboard after a set.

NIGHT SPOTTING OF SARDINE SCHOOLS BY AIRPLANE SUCCESSFUL: A new development the latter part of 1955 in the purse-seine night fishery for sardines off the coast of California is the use of small planes for spotting the schools and directing the setting of the seine. The sardine schools are clearly visible from the air at altitudes of from 500 to 1,000 feet, according to the Service's Market News Reporter at San Pedro.

After the schools of sardines are spotted by the airplane, the pilot gives detailed instructions as to when the net skiff should be dropped, and the circle around the fish made. During the course of a six-hour flight, one pilot in a small plane successfully set nine purse seiners on sardine schools estimated to total about 500 tons.

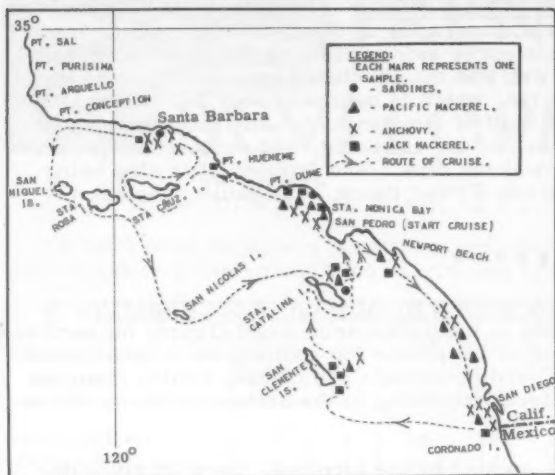
At the present time over one-half of the purse-seine fleet is depending on the spotting planes to locate sardine and mackerel schools. It is believed that this method of spotting and setting on schools of pelagic fish has tremendous possibilities. There are three planes now operating out of San Pedro, and they scout the Southern California fishing areas all night long when the seiners are out.

The pilot works on a share basis of 5 percent of the gross stock and it is estimated that his share of the proceeds of the trips will average close to 200 dollars based on an average catch of 100 tons.

In the 1955/56 sardine season there has been an increase in California in the use of airplanes to locate sardine schools and set the seiners on fish. Scouting planes in the past have been used to a small extent in the daytime fishery for anchovies and mackerel.

SARDINE, ANCHOVY, AND MACKEREL POPULATIONS SURVEYED BY "YELLOWFIN" (Cruise 55-Y-8): A census of the populations of sardines, northern anchovies, jack mackerel, and Pacific mackerel off the Southern California coastal area was the chief purpose of cruise 8 of the Yellowfin, a research vessel operated by the California Department of Fish and Game Marine Fisheries Branch. The secondary purpose was to mark and hold for observation various hook-and-line specimens with experimental tags. The vessel sailed October 5 and returned October 24, 1955, to Los Angeles Harbor. Operations were conducted along the coast of Southern California from Pt. Conception to the California-Mexico boundary including portions of San Clemente, Santa Catalina, San Nicolas, Santa Barbara, Anacapa, Santa Cruz, Santa Rosa, and San Miguel Islands.

A total of 130 light stations were occupied, of which 3 yielded sardines, 14 Pacific mackerel, 12 jack mackerel, 17 northern anchovies. At 7 of the light stations,



M/V Yellowfin Cruise 55-Y-8 of October 5-24, 1955.

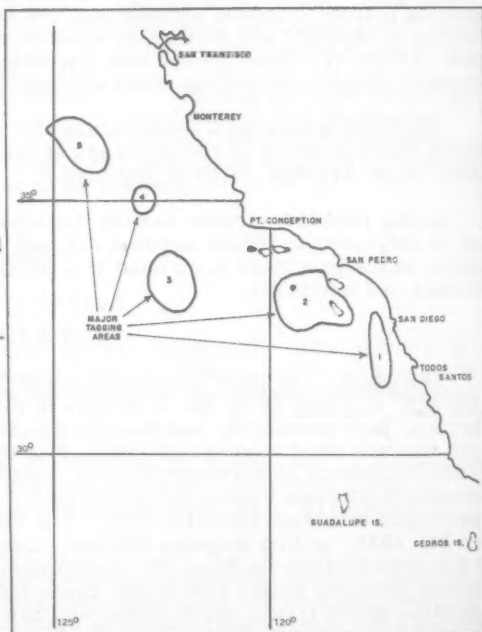
conditions prevented use of the blanket net but observations were made as follows: 3 stations Pacific mackerel, 1 jack mackerel, 3 anchovies. Of the 3 sardine samples taken, the size range varied from a maximum 228 mm. standard length (10.5 inches total length) to a 191 mm. minimum standard length (8.8 inches total length). Throughout the area surveyed, sardines were most abundant around the northern Channel Islands and Point Huene. Pacific mackerel, jack mackerel, and northern anchovies were seen in nearly all the areas surveyed. It appears that sardine distribution and abundance is similar to that of 1954.

line during daytime anchorages. These fishes were tagged with present and experimental tagging materials and are being held in aquaria.

The Yellowfin scouted for fish schools a total of 506 miles--283 schools were observed visually and on the scanar, of which it was estimated that 23 contained sardines, 87 mackerel, 43 anchovies, 27 sauries, 103 unknown.

Surface temperatures, bathythermograph casts, and reversing thermometer casts were taken at all stations. Surface temperatures throughout the cruise ranged from a minimum of 13.5° C. (56.3° F.) at San Miguel Island to a maximum of 18.7° C. (65.7° F.) at La Jolla (Scripps pier). Sardines were sampled where surface temperatures ranged from 15.2° C. (59.4° F.) to 16.6° C. (61.9° F.).

ALBACORE TAGGING TRIP COMPLETED BY THE "ARCTIC": The commercial fishing vessel Arctic returned from an albacore tuna tagging cruise (Cruise 55-C-6) on October 17, 1955. During the cruise (started from San Pedro on August 4, 1955) 216 albacore ranging 20.4-25.5 inches in size were tagged with type G ("spaghetti") tags. The tagging was conducted to further research



M/V Arctic, albacore tagging (Aug. 4-Oct. 17, 1955), Cruise 55-C-6.

Five specimens of white croaker, kelp bass, and Pacific mackerel were taken by hook and

on California's Department of Fish and Game studies of the population, growth rates, and migratory habits of the albacore. Additional experimental work was performed on tags colored pink, blue, and white to determine if the color has any relationship to recovery success.

The area of operations extended from 40 miles WSW. of San Martin to 125 miles SW. of the Farallon Islands. The surface water temperatures at points albacore were caught ranged from 15.0° C. (59° F.) to 20.2° C. (68.4° F.).

Other observations and activities included: 1. Recording daily weather and sea condition, including barometric pressure, depth and color of water, and air temperatures.

2. All albacore were caught by trolling different kinds of lures. The most effective were yellow and green and red and white feathered jigs and light-green rubber squids. Salted anchovies were used to attract the schools of fish to the jigs.

3. On August 5, approximately 40 miles NW. of San Clements Island, 5 whales were sighted. Also in the same area (water temperature 63° F.) there were numerous Velella lata on the surface of the water.

4. Between October 8 and 10 a group of 15 to 20 whales were sighted 130 miles SW. of the Farallon Islands. They were tentatively identified as humpback.



Cans--Shipments for Fishery Products, January-October 1955



Total shipments of metal cans for fish and sea food during January-October 1955 amounted to 91,356 short tons of steel (based on the amount of steel consumed in the manufacture of cans), compared to 92,468 short tons for the same period last year.

Shipments of metal cans for fishery products increased sharply in October 1955.

Note: Statistics cover all commercial and captive plants known to be producing metal cans. Reported in base boxes of steel consumed in the manufacture of cans, the data for fishery products are converted to tons of steel by using the factor: 23.0 base boxes of steel equal one short ton of steel.



Carp Control Project Completed at Malheur Refuge

A mammoth carp control project in waters of the Malheur National Wildlife Refuge in southeastern Oregon has been completed, Secretary of the Interior Douglas McKay stated December 8, 1955.

The Malheur rehabilitation project was done primarily in the interest of the migratory waterfowl which use the lake and the adjacent area for a resting and feeding spot. Most such rehabilitation jobs have been done primarily to rid fishing waters of trash fish to permit restocking with more acceptable types.

It is estimated that at least 1,500,000 carp died of the rotenone toxicant placed in Malheur Lake by the Fish and Wildlife Service in late October 1955. It will be several years before the carp again increase to numbers capable of doing serious damage to the waterfowl feeding areas in the lake, Fish and Wildlife Service spokesmen said.

After the main eradication job was complete, careful scrutiny of the lake was made and isolated areas, apparently fresh-water seeps, which still harbored small bunches of carp, were given added treatment. Wildlife officials say that 99 barrels of rotenone toxicant were used in the 10,000-acre lake. Additional amounts were used to treat more than 100 miles of streams and innumerable ponds and lagoons in the area.



Rotenone kills fish by affecting the gill as it is drawn through the gill with the water. It does not enter the body of the fish. Fish killed by rotenone can be and are used as food by human beings.

Malheur Lake is an important link in the Pacific Waterfowl Flyway and until the advent of the carp it was one of the finest feeding grounds in the West. Its shallow waters and broad expanse provided space and feed for hundreds of thousands of migratory birds. During the past two or three years not more than ten percent of the customary numbers of ducks stopped at the lake because of the destruction of waterfowl food plants by the carp. The carp not only root up and consume sago pondweed and other aquatic plants but they so muddy the waters that sunshine cannot penetrate to stimulate growth of new plants.

Malheur Lake had a maximum depth of only 14 inches at the time of the eradication.

In recent years waters in almost every part of the Nation have been rehabilitated by the use of rotenone compounds. The Malheur Lake project is by far the largest as far as water surface is concerned. Two other huge projects conducted by States recently under the Federal Aid in Fish Restoration program are the Marias River job in northwestern Montana and the Diamond Lake project in Oregon. In each of these instances the respective States planned and executed the projects.

The Marias River work was completed a few months ago. It consisted in killing the fish in the Marias River from Tiber Dam to the headwaters of all the tributaries. Willow, Medicine, Cutbank, Francis Lake Creeks, and other tributaries were all given the rotenone treatment. The project was timed to rid these waters of trash fish before the gates were closed on the new Bureau of Reclamation Tiber Dam. The streams will be restocked with game fish.

The 1954 project on Diamond Lake in Oregon was unique in many respects. The lake covered about 3,000 acres. It was 52 feet deep before eight feet of water was drawn off preparatory to the eradication effort. More than 100 tons of rotenone were used and an estimated 32,000,000 Klamath roach, or chubs, totaling about 400 tons, were killed in a few days. It will be open for sport fishing in 1956.



City Residents Show Greater Preference for Fish Products

In a nationwide survey the U. S. Fish and Wildlife Service has learned that residents of cities show a greater preference for breaded fish sticks and breaded shrimp than do the residents of rural America. And also residents of cities show a much higher preference for fish and shellfish served in restaurants than do residents of rural America.

This is part of the information contained in a report released November 14, 1955, by the Service on the result of the survey. This report is the second of three reports on this project.

The purpose of the survey was to provide the fishing industry with data valuable in adjusting fish-product production to the demand and tastes of the consuming public. The survey was made by National Family Opinion, Inc., of Toledo, Ohio.

The survey showed that breaded shrimp consumption is concentrated in the city areas on a ratio of about two to one over the rural areas.

Fish sticks have shown a spectacular increase in the city areas. About 40 percent of the city housewives report using fish sticks, while only 13 percent of the rural women report their use.

The predominating marketing problem is to get housewives to try the products--90 percent of those who have tried breaded shrimp report satisfaction while about 85 percent of those who have tried fish sticks become regular users.

Data were also obtained on sources of fish cookery information. The cookbook is the chief source of instruction to housewives in cooking fishery products--28 percent of the housewives give that as their source, about 12 percent get their information from newspapers or magazines, and 11 percent look at the label or the wrapper.



Federal Purchases of Fishery Products

FRESH AND FROZEN FISHERY PRODUCTS PURCHASED BY DEPARTMENT OF DEFENSE, SEPTEMBER 1955: For the military feeding of the U. S. Army, Navy, Marine Corps, and Air Force, the Army Quartermaster Corps in September 1955 purchased fresh and frozen fishery products amounting to 1.8 million pounds, valued at \$0.8 million (see table). This was a decrease of 22.5 percent in quantity and 19.8 percent in value as compared with August purchases, and also lower by 36.7 percent and 21.8 percent, respectively, than September 1954 purchases.

Purchases of Fresh and Frozen Fishery Products by Department of Defense (September and the First Nine Months of 1955 and 1954)							
QUANTITY				VALUE			
September 1955	1954	Jan.-Sept. 1955	1954	September 1955	1954	Jan.-Sept. 1955	1954
.. (Millions of Pounds) (Millions of Dollars) ..			
1.8	2.8	19.3	19.0	0.8	1.1	8.3	7.8

Purchases of fresh and frozen fish by the Army Quartermaster Corps during the first nine months in 1955 totaled 19.3 million pounds (valued at \$8.3 million) as compared with purchases of 19.0 million pounds (valued at \$7.8 million) for the similar period a year earlier.

The Department of the Army paid in September 1955 an average price of 45.9 cents per pound for fresh and frozen fishery products as compared with 44.3 cents in August and 37.1 cents in September 1955.

In addition to the purchases of fresh and frozen fishery products indicated above, the Armed Forces generally make local purchases which are not included in the above figures. Therefore, actual purchases are somewhat higher than indicated, but it is not possible to obtain data on the local purchases made by military establishments throughout the country.

QUARTERMASTER CORPS HAS COMPLETED FY 1956 PURCHASES OF CANNED TUNA: All of its canned tuna requirements for the current fiscal year of 1956 (July 1, 1955-June 30, 1956) have been purchased, the Office of the Quartermaster General announced recently. Requirements of canned tuna for fiscal year 1956 included 3,962,858 pounds for the Army and Air Force, 376,194 pounds for the Navy, and 111,408 pounds for the Marine Corps. All of these procurements were completed on December 7, 1955.

Purchases of canned tuna in the last five fiscal years were as follows (in pounds): FY 1956, 4,450,460; FY 1955, 2,839,000; FY 1954, 1,651,000; FY 1953, 880,000; FY 1952, 2,552,000.

THE QUARTERMASTER MARKET CENTER SYSTEM: A little over two years ago the military procurement of canned foods was transferred by the Quartermaster General from the jurisdiction of three principal QM depots to the Market Center System with headquarters in Chicago. Following this change in procurement responsibility, the Commanding General of the Market Center System in an address at the N.C.A. Convention in Atlantic City in January, 1954, briefly described the operations of the System and outlined the procurement procedures that would be followed in purchasing canned foods.

The Quartermaster Market Center System is the Army agency which, under the single-service procurement mission assigned by the Department of Defense, procures all foods consumed by the Armed Forces except for food items purchased locally by military installations, and, further, which procures subsistence items for resale in military commissary stores, for supplying the National Guard and Organized Reserves while on active duty, for Foreign Aid, and in some instances for other Governmental agencies. As an added responsibility, the System is charged with the storage and distribution of perishable food in the continental United States.

The Quartermaster Market Center System is comprised of 10 market centers, located near the nation's principal food-producing areas and the military installations they supply. The Market Center in Chicago, Ill., functions in a dual role; as market center and as Headquarters for the entire System. Connected with this focal point are the Market Centers in New York, N. Y.; Richmond, Va.; Columbia, S.C.; New Orleans, La.; Fort Worth, Tex.; Kansas City, Mo.; Seattle, Wash.; Los Angeles, Calif.; and Oakland, Calif.

Supplementing the Market Centers are 11 permanent field offices maintained at strategic points within Market Center areas. Such offices are situated in Boston, Mass.; Alexandria, Va.; Orlando, Fla.; Nashville, Tenn.; Mobile, Ala.; San Antonio, Tex.; Denver, Colo.; El Paso, Tex.; Tacoma, Wash.; San Diego, Calif.; and Salt Lake City, Utah.

PURCHASING PERISHABLES: The Market Center System was originally brought into being to purchase perishable subsistence only. Such purchases constitute the most important portion of the total annual food purchase of the System (about 70 percent of total military food expenditures).

THE MACHINERY IN MOTION: Under direction of the Quartermaster General, Washington, D. C., who established over-all policy, the Chicago Headquarters is the heart of the Market Center System.

Each Market Center maintains direct contact with Chicago and with its counterparts in the System by means of a teletype network. Each maintains close contact with market conditions in its individual area, and advises Headquarters of availabilities, condition of products, prices, and various factors affecting present or future crops. By comparing all information available, Headquarters directs the procurement and distribution programs of the entire System.

The basic reason for the Market Centers' existence is, naturally, the serviceman, who requires about 5 pounds of food daily. In OQMG headquarters, a Master Menu, suggesting the composition of every meal for each day of the year is made up and delivered to all stateside military installations 6 months in advance of designated dates. With this as a guide, and taking into consideration any local situations which require deviation from the Master Menu, installations compute their monthly perishable requirements and submit these to the designated Market Center.

After requirements from individual installations within its area have been received, the servicing Market Center consolidates them into carlot and trucklot quantities wherever possible, taking into consideration the item's perishability, planned consumption dates, and storage and handling facilities at the requesting installation. If less than carlot and trucklot quantities are requisitioned, due to limited demand, such requests are consolidated wherever possible with similar small-lot requisitions from other posts, camps, and stations into more economical carlots and trucklots at special assembly and distribution points maintained within Market Center areas. On carload or truckload quantities, Notices of Intent to Purchase (NIP's) are sent to the trade nationwide, stating the items and quantities required, the destination, and time of closing for offers. The vendor telephones his offer usually within 2 hours before closing to the nearest Market Center. All details concerning these offers are immediately recorded on a summary sheet and compared to determine which offer is the low responsible offer.

Offerings for carlot and trucklot requirements, whether for delivery direct to installation or to a distribution point for redistribution, are solicited and compared on a national basis using the teletype network. Headquarters, Market Center System, determines the low offer on a nationwide basis and issues instructions as to which Market Center is to make the award and administer the contract. Procurements are made on the basis of the best value to the Government, considering the item's quality and desirability, and, where applicable, transportation and distribution costs.

Purchases of perishable subsistence are made from all over the country. With information constantly at hand concerning availability and price of every type of fresh food needed by the Military, the System buys commodities at seasonal production peaks and effects balances by shifting procurement from items in short supply to others more abundant. Purchases are made on the spot for specified amounts and at quoted prices. Payments are made promptly, and, although savings to the taxpayers run into the millions of dollars per year through this unification of purchases as compared with pre-World War II local buying by all of the Services in competition with one another and without uniform standards, suppliers are benefited by knowing the quantities and qualities desired and by the equal opportunity offered all.

Most important is the effect upon the feeding of the military personnel. Fresh foods of all types are delivered in quantity to military installations speedily and in prime condition. Spoilage has become a negligible factor--less than one percent. Thus, America's soldiers, sailors, airmen, and marines are supplied with the finest food any military organization has enjoyed from the beginning of history.

NONPERISHABLE SUBSISTENCE: Prior to 1953, nonperishable subsistence items were procured by Quartermaster Procurement Agencies in Chicago, New York, and Oakland. In that year, such procurement was transferred to the Market Center System, thus consolidating all central food-procurement activities.

Requirements for nonperishable foods are received from the components of the Services, and

Note: A detailed description of the Market Center System and the policies and procedures that govern its nonperishable as well as perishable subsistence procurement was published in the "Activities Report" of the Quartermaster Food and Container Institute for the Armed Forces for the first quarter of 1955.

procurement schedules are arranged in accordance with needs. Canned meats, fruits, and vegetables are procured from seasonal packs. Canned meat and water-food (fishery products) procurement is timed to coincide with peak slaughter periods. Canned tuna and salmon are procured on an annual basis during the peak of seasonal pack. Nonperishable items experiencing little or no seasonal production variation are procured quarterly, or as needed.

Whenever possible, commercial-type products are used by the Armed Services, although certain types of items, such as operational rations, must be purchased under Military specifications to meet military requirements. Likewise, commercial packaging and packing is used to the greatest extent feasible.

Procurement decentralization in Market Center operations permitting industry to deal with a purchasing office in a nearby location is a feature of the System. For example, canned tuna and canned salmon are procured by the Market Centers closest to the area in which production is concentrated--in these instances, Los Angeles and Seattle. This decentralization of purchasing fosters the close relationship between the food industry and procurement personnel essential to the most effective and economical purchasing. Because of this relationship, personnel are kept informed of latest industrial techniques on nonperishable subsistence, and procurement patterns may be periodically revised to coincide with those techniques.

Each Market Center has a QM Inspection Service Command Veterinarian to process contracts awarded by that particular Market Center. These veterinary officers come under direct control of the Chief Veterinarian at Hq., QM Market Center System. Their mission is to arrange for origin inspection of awards made by the contracting officer, wherever he may be. They do not make the inspection themselves--field inspections are conducted by the Army Area Veterinarian or other recognized Federal Agencies. Destination inspections are arranged through established policy by Hq., QM Market Center System through menus and Inspection Handbooks. The branch Market Center veterinary officer arranges to have an inspection made.

MILITARY FOOD SERVICE UNIFIED: All military subsistence--encompassing the entire supply field from research and development through issue or disposal, including cataloging, standardization, requirements determination, procurement, production, inspection, storage, distribution, transportation, and maintenance--have been placed under a "Single Manager Commodity Assignment" in the Department of the Army.

The Secretary of the Army will issue in the near future an implementing directive designating the agency within the Army that will administer the authority. It is expected that the Office of the Quartermaster General will receive this delegation of authority and it is understood that OQMG has been preparing to take over this en-

larged assignment and has prepared a reorganization program which will establish within OQMG a subsistence organization.

This centralization of subsistence responsibility in the Army with operational authority in the Quartermaster General will have no immediate effect on government procurement policies applicable to the canning industry. The Market Center System will continue to be the principal contact with the industry and will continue to purchase canned foods for all military needs, according to a November 7 release from the Department of Defense.

The new unified supply program is spelled out in a Department of Defense directive dated November 4, 1955. The directive provides for a subsistence advisory group composed of a committee representing each of the military services and the Single Manager of the Department of the Army to coordinate operating problems.

In a press statement accompanying the issuance of the directive, the Department of Defense stated that the system had been "developed over the past year in the Office of the Secretary of Defense, is called the Single Manager Commodity Assignment, and places all supply responsibilities for a given commodity under a single military department which will supply the needs of all services."

NEW INFORMATION ON MILITARY PROCUREMENT OF FOODS: As a service to all interested elements of the food industry, arrangements have been made to make available additional information on military procurement of foods, it was announced November 9, 1955, by the Food Industries Division, Business and Defense Services Administration, U. S. Department of Commerce.

Division officials, who cooperated with the Office of the Quartermaster General of the Army and food industry representatives in making the arrangements, said that additional information will be posted on the bulletin boards, and thus be available for perusal at the Quartermaster Market Centers.

Generally, notices of intent to purchase food items in small amounts (normally less than trucklot or carlot) have been distributed to interested suppliers on the local mailing list covering the trade area of the Market Center issuing the notice, while the notices for food items in larger amounts have been distributed to interested suppliers on the national mailing list.

A recent change provides that, in addition, notices of intent to purchase non-perishable foods and frozen fruits and vegetables are to be posted on the bulletin board of the issuing Market Center, and if distributed to the national list, on the bulletin boards of all the Market Centers.

All proposed procurements of nonperishable foods in excess of \$10,000 will continue to be summarized and reported to the U. S. Department of Commerce for inclusion in the "Synopsis of U. S. Government Proposed Procurement, Sales, and Contract Awards" issued by the Office of Field Services. In addition, the summaries will now also appear on the bulletin boards of the QM Market Centers preparing the report. Nonperishable food contract awards will continue to be summarized in a weekly report to the Department of Commerce for inclusion in the synopsis. In addition, a copy of the summary of awards over \$25,000 and a summary of all awards of nonperishable foods in amounts between \$1,000 and \$25,000 are now available for perusal on the bulletin board at the awarding Market Center.

For the first time, copies of all contracts in excess of \$1,000 for both perishable items are available for perusal at the issuing Market Center.

The Quartermaster Market Centers are located at 226 W. Jackson Blvd., Chicago 6, Ill.; 1321 Pendleton Street, Columbia 1, S. C.; 623 Hardesty Street, Kansas City 24, Mo.; Felix at Hemphill, Fort Worth 1, Tex.; 1206 Santee Street, Los Angeles 15, Calif.; Gulf Transportation Terminal Command, New Orleans 12, La.; 29th St. and 3rd Ave., Brooklyn 32, N. Y.; 2155 Webster St., Alameda, Calif.; 1709 Kelly Road, Richmond 20, Va.; and NSD, Pier 91, Seattle 14, Wash.



Fresh and Frozen Fish Consumption in Federal Penal and Correctional Institutions, 1954

The consumption in 1954 of fresh and frozen fish in 27 Federal penal and correctional institutions was surveyed by the U. S. Fish and Wildlife Service. Information about fresh and frozen shellfish purchases was also requested from these sources, but such purchases were so rare, consisting of only a few purchases, that a report on these items will not be made. These institutions had a combined population averaging 21,175 persons, and are located throughout the United States with the greatest concentration (13 out of 27) in the South.

In 1954, all Federal penal and correctional institutions purchased one or more species of fresh and frozen fish. Institutions in the South purchased the greatest quantity of

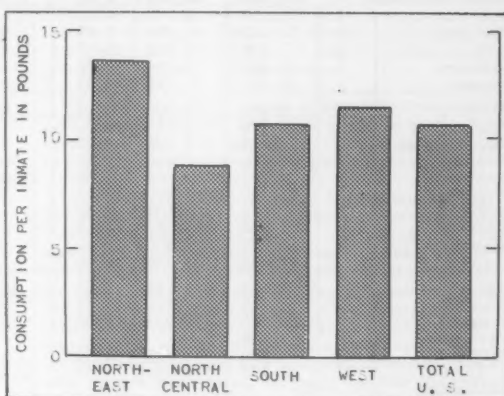


Fig. 1 - Regional consumption per inmate of fresh and frozen fish in all Federal penal and correctional institutions, 1954.

Table 1 - Fresh and Frozen Fish Purchased By All Federal Penal and Correctional Institutions, 1954

Species	No. of Inst.	Average Pop. of Inst.	Annual Consumption ^{1/}		Annual Cost	
			Total	Per Inmate	Total Value	Average Price
		No.	Lbs.	Lbs.	\$	¢/Lb.
ALL FRESH AND FROZEN FISH	27	21,175	210,701	9.95	54,088.52	.26
ALL GROUND FISH FILLETS (INCLUDING OCEAN PERCH):	26	20,775	159,590	7.68	42,648.16	.27
Ocean perch	21	17,535	70,440	4.02	19,253.52	.27
Haddock	16	12,490	41,180	3.30	11,237.25	.27
Cod	11	9,765	27,235	2.79	7,156.40	.26
Pollock (Boston bluefish) . .	7	5,730	19,100	3.33	4,650.14	.24
Hake	2	1,140	1,635	1.43	350.85	.21
ALL OTHER FILLETS:	7	7,925	29,180	3.68	6,375.10	.22
Whiting	3	5,175	13,920	2.69	2,722.70	.20
Catfish	1	2,600	6,400	2.46	1,280.00	.20
Mackerel	4	4,700	4,520	0.96	1,336.40	.30
Flounders	3	4,450	2,540	0.57	604.00	.24
Halibut	1	650	1,800	2.77	432.00	.24
ALL DRESSED FISH:	6	7,960	21,931	2.76	5,065.26	.23
Rock cod (rockfish)	3	2,220	8,890	4.00	1,773.80	.20
Salmon	2	2,700	6,246	2.31	1,595.76	.26
Halibut	1	1,400	4,150	2.96	996.00	.24
Whiting	3	3,390	2,135	0.63	590.80	.28
Smelt	1	320	360	1.13	68.40	.19
Drum	1	640	150	0.23	40.50	.27

^{1/} Market weight.

fresh and frozen fish because of the greater number there. However, consumption per inmate was relatively lower in the South and North Central areas than in the Northeastern and Western areas of the country.

Table 2 - Regional Distribution of Fresh and Frozen Fish Consumption^{1/} in All Federal Penal and Correctional Institutions, 1954

Region and State	No. of Inst.	Avg. Pop. of Inst.	Groundfish Fillets (incl. Ocean Perch)		Other Fillets		Dressed Fish		All Fish	
			Total Quantity	Per Inmate	Total Quantity	Per Inmate	Total Quantity	Per Inmate	Total Quantity	Per Inmate
			Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
NORTHEAST: . . .	3	2,000	20,220	10.11	3,320	1.66	2,820	1.41	26,360	13.18
Connecticut . . .	1	500	5,940	11.88	-	-	-	-	5,940	11.88
New York . . .	1	200	3,000	15.00	500	2.50	-	-	3,500	17.50
Pennsylvania . . .	1	1,300	11,280	8.68	2,820	2.17	2,820	2.17	16,920	13.02
NORTH CENTRAL: . . .	5	7,000	50,320	7.19	7,060	1.01	1,460	0.21	58,840	8.41
Ohio	1	1,250	5,360	4.29	2,680	2.14	-	-	8,040	6.43
Michigan	1	650	3,800	5.85	1,800	2.77	-	-	5,600	8.62
Indiana	1	1,325	15,480	11.68	2,580	1.95	-	-	18,060	13.63
Missouri	1	1,100	14,000	12.73	-	-	-	-	14,000	12.73
Kansas	1	2,675	11,680	4.37	-	-	1,460	0.55	13,140	4.91
SOUTH:	13	8,980	72,895	8.12	18,800	2.09	825	0.09	92,520	10.03
Wash., D. C.	1	460	4,050	8.80	-	-	-	-	4,050	8.80
West Virginia	2	890	5,935	6.67	-	-	585	0.66	6,520	7.33
Virginia	2	875	6,840	7.82	-	-	240	0.27	7,080	8.09
Georgia	1	2,600	15,200	5.85	18,000	6.92	-	-	33,200	12.77
Florida	1	600	7,200	12.00	800	1.33	-	-	8,000	13.33
Kentucky	1	525	3,900	7.43	-	-	-	-	3,900	7.43
Alabama	1	240	3,640	15.17	-	-	-	-	3,640	15.17
Oklahoma	1	1,100	7,200	6.55	-	-	-	-	7,200	6.55
Texas	3	1,690	18,930	11.20	-	-	-	-	18,930	11.20
WEST:	6	3,195	16,155	5.06	-	-	16,826	5.27	32,981	10.32
Colorado	1	400	4,725	11.81	-	-	-	-	4,725	11.81
Arizona	2	575	5,900	10.26	-	-	-	-	5,900	10.26
Washington	1	1,400	-	-	-	-	12,936	9.24	12,936	9.24
California	2	820	5,530	6.74	-	-	3,890	4.74	9,420	11.49
Total	27	21,175	159,590	7.54	29,180	1.38	21,931	1.04	210,701	9.95

^{1/}Market weight.

The average annual consumption of fresh and frozen fish in the 27 institutions studied was 9.95 pounds per inmate. The great bulk of fresh and frozen fish was purchased in the form of fillets. Only a minor part of the purchases consisted of dressed whole fish. The Northeastern area reported the highest consumption per inmate with 13.18 pounds of fresh and frozen fish while the North Central area reported the lowest with 8.41 pounds per inmate.

Of the 3 groups of fresh and frozen fish purchased, groundfish fillets (including ocean perch) were purchased in greatest quantity and by all but one penal institution in the West. Groundfish fillet consumption was 7.54 pounds per inmate with the highest consumption reported in the Northeast (10.11 pounds per inmate), and the lowest in the West (5.06 pounds per inmate).

Ocean perch and haddock ranked first and second in quantities purchased. Ocean perch was purchased by better than three-fourths of the institutions and haddock by over one-half. Annual inmate consumption of ocean perch exceeded that of any other species.

Average cost per pound of fresh and frozen fish purchased ranged from 19 cents per pound for smelts to 30 cents per pound for mackerel. Average cost per pound of groundfish fillets slightly exceeded the average cost per pound of all other types of fish purchased.



Florida

FISHERIES RESEARCH, MARCH-SEPTEMBER 1955: Mullet: Analysis of the mullet tagging work was completed, involving 12,647 tagged fish. Results showed that over 70 percent of the fish were caught within 5 miles of the point of release. The time free and the size of the fish seemed to have little effect on the distance migrated. Fish tagged just before they spawned were returned by the fishery as frequently as those tagged at other times, indicating that fish survive spawning. This is contrary to some fishermen's belief. Judging by the rate of returns, the fishery has a definite effect on the amount of fish in the population.

Extensive field activities marked the economic research on the Florida fresh-fish (principally mullet) industry. All the southeastern states were visited, as well as several northern market areas. Florida was covered as well. Price and distribution information, institutional market needs, and other basic data were collected. Promotional material is being tested and canned mullet development is being pushed, plus tests of mullet fish sticks. Research is continuing on the development of an acceptable quality pack of canned mullet. This product was received favorably by members of the industry attending the annual meeting of the Southeastern Fisheries Association at Miami Beach.

Shrimp: Work on the Key West shrimp has consisted of starting a sampling program of the shrimp on the Tortugas grounds. A large section of the Key West shrimp industry is disturbed at the continual landing of small shrimp--more than about 60 to the pound. They claim that the landing of these shrimp depletes the stocks and upsets the market. The purpose of the sampling program will be to devise methods of controlling the landings of small shrimp if this is considered necessary. Three alternative methods of restricting fishing are being considered: closed areas, closed seasons, and mesh regulations.

A Key West shrimp trawler, the *Manboy*, has been chartered for a period of twelve months to carry out two nights' fishing each month. The sampling program is set up to determine the distribution of shrimp by lengths, both seasonally and geographically. Cod ends of different mesh sizes will be used during the course of the sampling trips. These cod ends will be loosely covered with one-inch mesh netting. Thus the escape behavior of shrimp through cod ends of different mesh sizes can be studied. Observations will also be made on the condition of the shrimp which escape and on the escape of industrial or noncommercial species of fish.

It is expected that not only will the use of a larger cod-end mesh allow small shrimp to escape but noncommercial species will also escape and thus ease the problem of sorting out the shrimp. The use of a larger mesh cod end would allow better water filtration, particularly if some of the noncommercial species escaped, and the net should operate more efficiently.

Two days' fishing have been done. The cod end used was of the smallest mesh size at present being used on the Key West grounds, about $1\frac{1}{2}$ -inch stretched between opposite knots when wet and in use. Small numbers of small shrimp and noncommercial fish were taken in the cover so it is likely

that the escape through a larger mesh cod end would be considerable. The next tests will use larger meshes.

Technology: ICE RESEARCH: Further experiments are conducted with aureomycin and terramycin ices. The method of manufacturing antibiotic ices has been simplified and as many as 11 different ices can be tested at one time.

Aureomycin ice increases the shelf life of fresh shrimp, but its use presents a serious difficulty. The bivalent-metal ions used to chelate the antibiotic to the carrier, catalyze apparently the formation of black spot. Calcium, magnesium, cobalt, nickel, and manganese salts were tested, of which the last two showed the best results in keeping black spot at a minimum. A similar problem complicates the work with terramycin.

The preservative action of ice containing mixtures of aureomycin and terramycin is now under investigation. The next phase in this research is to test the antibiotic ices aboard a fishing vessel.

ANTIOXIDANTS: A potent antioxidant IONOL has been tested for its black spot-retarding ability under accelerated oxidation. The results showed some retarding activity and more elaborate IONOL-ice tests were run. These tests, however, produced inconclusive results. It is planned to repeat the experiment. Versenes were also tested but found to be ineffective. Research on sodium bisulphite, which was found to be an effective black spot-retarding agent has been reactivated. Residuals in raw and cooked shrimp, and the amount of destruction of thiamine are being studied. This information is necessary in order to obtain U. S. Food and Drug Administration clearance to use the chemical in shrimp. It is also planned to develop a method to incorporate bisulphite in 300-pound ice blocks. This size of block is commonly used in the industry.

SPOILAGE STUDIES: The value of indole as an indicator of spoilage in shrimp has been studied. The method of extracting the indole has been modified and a greater accuracy achieved. Good correlation with odor were obtained. The use of this indicator in the industry does not seem to have a good chance since its determination requires a substantial amount of equipment, but it may be useful as a laboratory test. A paper covering the above research is under preparation.

Tampa shrimp producers using immersion freezers have recently found that in some instances their shrimp develop severe black spotting after 2 to 3 months of storage. Preliminary analysis of the brines has shown that the old brine contained a considerable amount of organic matter, twice as much iron and 7 percent less salt. Further studies are in progress.

MULLET FISH STICKS: A test panel tasted mullet fish sticks made up over 12 months ago. The majority of tasters found that mullet fish sticks stored that long in freezer storage developed a strong rancid taste. A final report on this experiment is being prepared.

BLUE CRAB: The demonstration soft-shell crab-shedding float installed at Gulf Shore Seafood Inc.,

Punta Gorda, was completed during the period reported on. A self-priming Jaeger pump with a pumping capacity of 35 gallons per minute was installed. The dealer expressed satisfaction with the system and soft-shell crabs are being produced. During the same period a crab fyke patterned after those used in Chesapeake Bay was placed in the Peace River. This gear consists of a wooden frame, 4' x 4' x 4', enclosed by one-inch chicken wire with one funnel through which the crabs can enter. A trap door is located on top to allow the crabs to be dumped out. The funnel side of the trap faces shoreward, and is placed from 300 to 500 feet from shore depending on the slope of the bottom. Extending from the funnel to the shore is a "leader" or wire fence which channels the crabs to the trap when returning from feeding on the outgoing tide. On the shore side of the trap are two wings which curve back to the leader. The fyke is not baited since the crabs are led to the trap by the fence.

This was the second fyke to be put in the Peace River. The first one which was placed in the wa-

ters on December 3, 1954, was destroyed. The second fyke, during the short period of time that it remained in the water, caught from 16 to 75 crabs a day. These figures are low since some crabs were stolen.

An experiment was conducted on the crabs held in the floats to determine the average time necessary for the various stages of crabs to shed. Ninety crabs were tagged with the tag formerly used to tag sailfish, and held in place by looping stainless steel wire from the tag to each of the spines on the carapace of the crab. Results were as follows:

Number	Stage	Avg. No. of Days to Shedding
30	White Margin	7
30	Pink Margin	4
30	Red Margin	2

It is intended to continue this study and to tag many more crabs to get more accurate data. These figures compare well with those made in observations on Chesapeake Bay crabs.



Maine

CANNED SARDINE STOCKS, NOVEMBER 1, 1955: Distributors' stocks of canned Maine sardines amounted to 354,000 actual cases as of November 1, 1955, and canners' stocks amounted to 625,000 standard cases (100 3 $\frac{1}{4}$ -oz. cans to the case), according to a U. S. Bureau of the Census survey. Canners' stocks on No-

Canned Maine Sardine Wholesale Distributors' and Canners' Stocks, November 1, 1955, and Comparisons				
Level	Nov. 1, 1955	July 1, 1955	April 1, 1955	Nov. 1, 1954
Distributors (actual cases)	354,000	235,000	331,000	N.A.
Canners (standard cases--100 3 $\frac{1}{4}$ -oz. cans)	625,000	723,000	715,000	1,410,000
N.A. - Not available				

vember 1, 1954, as reported by the Maine Sardine Industry, were 1,410,000 standard cases; comparable data for distributors' stocks are unavailable. Canners' stocks on November 1, 1955 were 56 percent less than on the same date in 1954, which reflects the lighter pack in 1955. Canners' stocks were 690,000 cases on April 15, 1955 (the beginning of the 1955/56 season), and the pack to November 1, 1955, was 1,167,000 standard cases, giving an available supply in 1955 through November 1 of 1,857,000 standard cases.

SARDINE PACK SMALLEST IN 15 YEARS: The 1955 Maine sardine canning season closed December 1 with the pack estimated to be the smallest in 15 years, according to a news release from the Maine Sardine Industry.

Although the final production figure is not available at this time, the industry's Executive Secretary stated that it will be about 1,230,000 standard cases (100 3 $\frac{1}{4}$ -oz. cans to case).

This is less than half of the average annual production during the past 14 years and only slightly more than the last short pack of 1,067,000 standard cases in 1940.

Canners' inventories reflect the shortage and are the lowest they have been on December 1 since World War II, according to the Executive Secretary, who predicted a complete sell-out before the 1956 season opens on April 15, 1956.

He added that from a quality standpoint the pack had been one of the best in years and that consumer demand had been steadily maintained in all sections of the country.

Most of the State's 43 plants were ready to operate when the season opened in April 1955, but of this total 12 plants did not operate at all. The fishing in 1955 was spotty and the situation exasperating throughout the entire packing period. The western area had the best fish supply, while the middle district had catches about 50 percent of average and there were virtually no fish at all in the big packing centers in the eastern district.



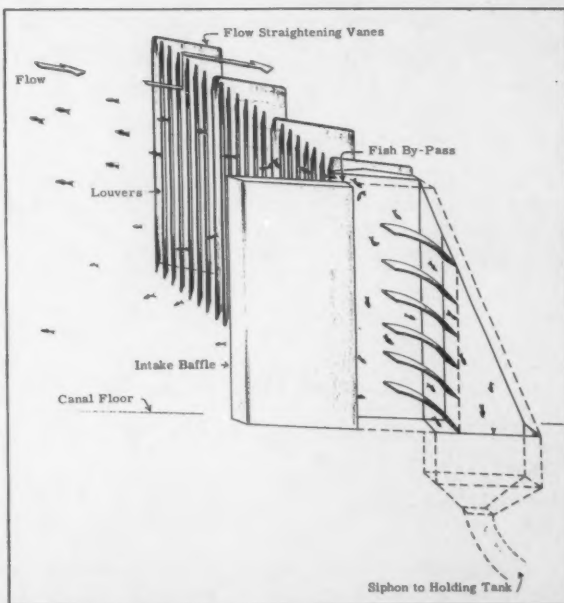
New Type Fish Screen to Save Young Fish

A unique "fish screen" will save millions of young salmon, bass, shad, and catfish from the turbulence of the world's second largest pumping plant--the Bureau of Reclamation's Tracy Pumping Plant on the Delta-Mendota Canal in central California--Secretary of the Interior Douglas McKay pointed out in announcing details of a \$988,116 contract for constructing the facilities.

A commercial and sportfishery resource estimated to be worth \$10 million annually will be protected by the fish diversion and collecting facilities, said Commissioner of Reclamation W. A. Dexheimer.

Existing temporary fish screens will be replaced by a louver-type diversion that "leads" the fish to safety. The novel design of the new facilities was developed after long and intensive study by Bureau of Reclamation engineers and Fish and Wildlife Service biologists, with the assistance of the California State Department of Fish and Game.

The Commissioner said that at one time the State estimated the cost of constructing conventional fish screens would total \$4 million. The new louver system is not only initially less expensive, he said, but the cost of maintaining it will be much less.



Schematic drawing of louver-type fish screen and fish collecting device.

The fish-protective device will consist of a row of vertical louvers extending approximately 340 feet diagonally across a concrete channel $83\frac{1}{2}$ feet wide and 25 feet deep. The minute baby fish, averaging an inch long, are carried tail first down the channel by the current, but as they approach the louvers they swim to one side to avoid the disturbing eddies and sounds made by the slats placed at an angle to the current. The fish keep moving over until they are siphoned into a bypass that carries them to a holding tank, from which the young fish are to be counted and trucked 40 to 50 miles to an area where they can swim safely to the sea.

The Tracy Pumping Plant, which draws water from the Delta area of the San Joaquin and Sacramento Rivers at the head of San Francisco Bay, lifts 4,600 cubic-foot-per-second of irrigation water 197 feet into the Delta-Mendota Canal which carries it 120 miles to supply Central Valley lands.

During periods of low flow in the rivers and when the canal is operated at capacity, the pumps will take all of the flow of San Joaquin River and may draw half of the Sacramento River.

The Delta, with its maze of channels, is the most important spawning and rearing area for striped bass and shad on the Pacific Coast. Young king salmon are found in great numbers in the waters of the Delta where they loiter on their way to the ocean. Catfish are an important sport fish taken in large numbers and spend their life cycle in the Delta waters.

Salmon, bass, and shad spawn in fresh water but spend their adult lives in the ocean. The young fish descend the rivers to the sea, carried by and following the major flows of water. Thus, the major diversion of the Delta-Mendota canal operating at full capacity would be nearly as great an attraction to these young fish as would the combined river flows to the ocean. Fish experts believe the great pumps of the Tracy plant would kill a major portion of fish entering the canal, and the fishery resource--of considerable importance to California--would be seriously damaged.

Devices to protect fish are included wherever necessary on all features of the Central Valley project, which provides irrigation water for 634,000 acres and produces 2,226,370,000 kilowatt hours of power annually from its multipurpose dams. Planned release of cool water from major dams such as Shasta, Keswick, Nimbus, and Folsom, helps maintain conditions favorable to salmon.



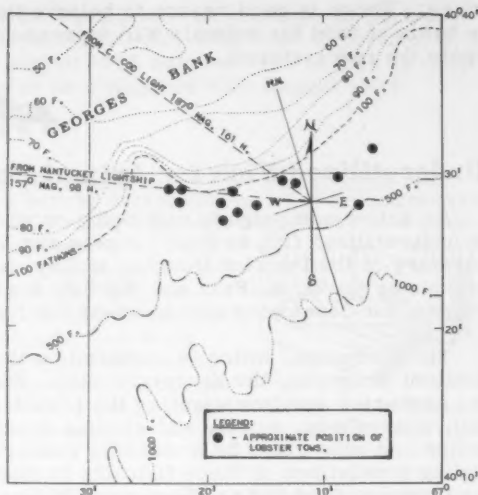
North Atlantic Fisheries Exploration and Gear Research

LOBSTERS CAUGHT AND TAGGED IN DEEP WATER BY "DELAWARE" (Cruise 12A): Extremely heavy wind and seas limited the Service's exploratory fishing vessel Delaware fishing operations to but 12 tows during an 8-day cruise which ended on November 22, 1955. The purpose of this cruise was to determine the extent of productive lobster grounds in deep water at the southeast edge of Georges Bank.

Substantial catches of large lobsters were made, totaling 1,065 with an average weight of $7\frac{1}{2}$ pounds each. All were taken by a standard No. 41 otter trawl, rigged with 10-fathom ground cables, and 45 feet of rollers. Average towing time was 90 minutes, and the average catch was 88.6 lobsters per tow. Fishing depths ranged from 100 to 200 fathoms, with the greatest numbers caught at 165 fathoms. The largest single catch made was 149 lobsters, or 1,200 pounds. The catch of other fish was negligible.

All lobsters landed in suitable condition were measured and tagged by biologists of the Massachusetts Division of Marine Fisheries. The tagged lobsters were released at or near the point of capture in order to try and determine if lobsters in the deep-water population intermingle with those living nearer shore. A total of 854 tagged lobsters were released, and 3 of these were subsequently recaptured by tows made in the same area. Of the 1,065 lobsters caught, 769 were females, and 101 of these bore eggs. Sizes caught ranged from less than one pound to a giant weighing 24 pounds.

Deep-water ocean perch will be the target of Delaware's Cruise 12B, scheduled to start on November 30, 1955. Area of the survey will be the edge of the Continental Shelf, East of Sable Island, Nova Scotia.



Cruise 12A of the Service's exploratory fishing vessel Delaware, November 14-22, 1955.



Underutilized Fish Potential Increases with Pet-Food Industry Growth

The use of fish and fish cuttings in the manufacture of pet food has developed into an increasingly-important segment of the fishing industry. The growth of the pet-food industry is illustrated by comparing the phenomenal increase in the number of standard cases of pet food (with fish as the basic ingredient) packed in 1947 to that of 1954. In 1947, only 940,000 standard cases (48 pounds each) of pet foods were packed; while, in 1954, over 4 million cases were packed. The value has increased from \$4 million to \$19 million. The industry packing food for animal feeding has been growing rapidly on the East, West, and Gulf Seaboard.

Along the Atlantic Coast, particularly the Northeastern Section, whole fish and fish frames from the filleting process are a source of raw material for pet food. In one section of the Gulf Coast, a new fishery has been developed which is primarily devoted to catching whole fish for processing into cat food. On the Pacific Coast, certain species of rockfishes and fish frames are used for canned pet food. Sales of canned pet food (that utilized fish as the basic component) have become so impressive that several large packing companies are now endeavoring to secure a steady supply of raw material.

In most of the fisheries that use trawling as a method of fishing, quantities of unmarketable or undersized fish are caught, but only a small percentage is used with the remainder discarded at sea. The Midwest has a similar disposal problem with fresh-water rough fish. However, there is a possibility that these fresh-water species can be used, and in time, create the backbone of an important pet-food processing industry.

Prospects are for an increasing demand for suitable protein food to be used in animal feeding. An example is the ever-increasing demand of the fur-animal farmers, who are experiencing difficulty in obtaining horse meat at reasonable

prices. There is good reason to believe that the demand for fish and fish scraps as the basis of food for animals will increase and that enterprising fish processors will supply the raw material.



Underutilized Fish for Animal Food Under Study in the Midwest

An active campaign is now being conducted in the Midwest to develop markets for underutilized fish as food for pets and commercially-reared fur-bearing animals, Secretary of the Interior Douglas McKay announced November 30. The work is being done by the U. S. Fish and Wildlife Service as part of the Saltonstall-Kennedy program for developing new markets for fishery products.

The campaign, which is centered on the shores of Lake Erie, already indicates excellent progress, the Secretary said. Fur-animal ranchers as well as some pet-food canneries are investigating the possibilities of a pet-food business utilizing carp, sheepshead, smelt, and similar species. The markets for these fish are limited and what could be a valuable resource is not being used. In addition, the expanding populations of these fish are having an adverse effect upon the growth of more popular food fishes, Secretary McKay added.

As a result of gradually-declining supplies of horse meat, which has been the basic fur-animal food, fur ranchers are investigating the possibilities of developing underutilized fish as a substitute.

The use of rough fish in the Midwest for animal food will not only help fill a growing demand on the fur-animal ranches but will enable the fishermen to utilize more effectively valuable inland fisheries resources, the Secretary said.

In recent years net fishermen in Lake Erie and other midwestern waters have reported that as much as 90 percent of their daily catches would be composed of fish having only a marginal market. This meant a lot of wasted time and effort, but with the possibility of a new outlet opening in the pet-food and fur-animal field, these rough fish can be made to pay their way.



U. S. Foreign Trade

United States Foreign Trade in Edible Fishery Products, August 1955 with Comparisons						
Item	Quantity			Value		
	August		Year	August		Year
	1955	1954	1954	1955	1954	1954
Imports:	(Millions of Lbs.)			(Millions of \$)		
Fish & shellfish: fresh, frozen, & processed 1/ . .	71.1	83.0	801.7	18.6	18.3	202.8
Exports:						
Fish & shellfish: processed 1/ only (excluding fresh and frozen). . .	5.8	4.1	50.8	1.6	.9	13.2
1/ Includes pastes, sauces, clam chowder and juice, and other specialties.						

EDIBLE FISHERY PRODUCTS, AUGUST 1955: United States imports of fresh, frozen, and processed edible fish and shellfish in August 1955 totaled 71.1 million pounds (valued at \$18.6 million), according to a Department of Commerce summary tabulation (see table). This was a decrease of 3.3 percent in quantity as compared with the July 1955 imports of 73.5 million pounds. The value was approximately the same for both July and August 1955. Compared with a year earlier, August 1955 imports were lower by 14.3 percent in quantity, but increased 1.6 percent in value.

Exports of processed edible fish and shellfish (excluding fresh and frozen) in

August totaled 5.8 million pounds (valued at \$1.6 million)--an increase of 20.8 percent in quantity and 33 percent in value as compared with July 1955 exports of 4.8 million pounds (valued at \$1.2 million). August 1955 exports were higher by 41.5 percent in quantity and 77.7 percent in value as compared with August 1954.

IMPORTS OF GROUNDFISH FILLETS INCREASED IN OCTOBER 1955: Imports of groundfish fillets (including ocean perch) during October 1955 amounted to 16.9 million pounds. Compared with the 15.1 million pounds reported for the corresponding month last year, this was an increase of 1.8 million pounds or 12 percent (see chart 7 in this issue). The increase was caused primarily by somewhat larger imports from Canada and Iceland. Compared with the same month of last year, Norway, Denmark, the Netherlands, and West Germany also exported more groundfish fillets to the United States during October 1955. Canada again led all other countries in exports of groundfish fillets with 12.2 million pounds--nearly 7 percent more than reported for October 1954. Canada accounted for 72 percent of the total fillet imports for October 1955.



Total fillet imports into the United States during the first 10 months of the current year amounted to 113.7 million pounds, compared with 120.2 million pounds during the same period of last year. This was a decrease of 5 percent. Canada, with 36.0 million pounds, led all other exporting countries during the ten-month period, followed by Iceland with 16.3 million pounds. These two countries accounted for 90 percent of the total for the 10-month period.



Vessel Insurance Survey Progress Report

The progress made in the "Study of Fishing Craft Hull and Protection and Indemnity Insurance" was outlined by a representative of the U. S. Fish and Wildlife Service at a meeting of the Atlantic States Marine Fisheries Commission held at Virginia Beach, Va., November 14 and 15. The contract for the study has been let to Boston University by the U. S. Fish and Wildlife Service.

The work to be performed will consist of a study of experience by insurance firms and fishing-craft owners with respect to hull and protection and indemnity risks.

A survey of the problem areas and plans and assignments of personnel for initial interviews with insurance companies have been completed.

During the last weeks of July and the month of August interviews were conducted with 12 insurance agencies, 4 owners' and producers' associations, 2 insurance associations, and 3 fishermen's unions along with 5 other organizations connected with the fisheries.

Cooperation has been most encouraging and has exceeded all expectations. Numerous letters have been received by Boston University from all parts of the country with offers of assistance and encouragement.

Some measures of relationship between factors, such as type of fishing activity, length of time at sea, and age of vessel with the incidence of loss of vessel are presently being examined on the basis of available insurance company records.

The U. S. Customs Bureau's listing of fishing vessels is presently being reconciled with the Service listing to be used as a population list from which to draw samples of vessel owners. It is anticipated that the migratory habits of certain vessels will cause some complications in the attempts to contact vessel captains and for this reason methods of selection and substitutions of vessels are being developed for this study.



Washington

JAPANESE SEED OYSTER EXPORTS PROGRAM FOR 1955: Seed oyster imports from Japan were inspected between January 25 and April 10, 1955, for the ninth consecutive year by Washington's Department of Fisheries. This inspection is carried out under General Order 249 and Amending Order 333 of that State's Director of Fisheries in accord with laws governing the control of oyster pests and predators within the State.

In 1955 there were only two exporting companies and three major buyers involved in the seed oyster business. All Miyagi seed exported was produced by either the Urato Seed Oyster

Annual Seed Oyster Imports to the Pacific Coast, January Through May, 1947-1955					
Year	Miyagi			Kumamoto	Total
	Unbroken	Broken	Hi-Count		
1955	6,174	42,434	5,200	404	54,212
1954	9,619	54,159	1,500	250	65,528
1953	15,945	53,486	-	682	70,113
1952	23,771	58,858	-	600	83,229
1951	23,655	28,094	-	150	51,899
1950	20,615	25,378	-	713	46,706
1949	19,741	25,268	-	1,060	46,009
1948	23,293	9,416	-	80	32,839
1947	35,692	20,897	-	30	56,619

Growers Association (through Nozaki & Co.) or the Miyagi Prefectural Seed Oyster Growers Association (through Tokyo Food Products Co.). The small amount of Kumamoto seed shipped was handled by Tokyo Food Products Co. for the Kumamoto Prefectural Government which is now underwriting the production of this seed.

The table summarizes the statistics on seed shipments January through May since 1947. Generally, most California and all Oregon and British Columbia imports are included in the table. Since 1953 the California January-May shipments have risen substantially with about 1,700 cases in 1953, 2,536 cases in 1954, and 10,036 cases in 1955. There is every reason to expect further increases during the next several years. This increase has been in a large part due to a revision in the State of California policies governing the management and allocation of oyster lands, according to a report by the Washington State Shellfish Laboratory at Quilcene.

Included in the table for 1955, but not distinguished as such, are about 4,000 cases of grade B broken seed, 20 cases of a new type of oyster (the Suminoe) from Kumamoto, and 20 cases of Miyagi seed caught on scallop-shell cultch. The decrease in imports during 1955 (as well as both 1953 and 1954) were in part a function of supply. In both 1953 and 1954 orders exceeded supply by 2,000 or more cases and in 1955 the shortage was between 14,000 and 1,6000

In contrast to the 9 to 11 ships needed to handle imports for the last three years, only 7 ships were utilized in 1955. The reduction of conference shipping rates on seed oysters this year resulted in the total absence of nonconference shipping.

Oyster Predator Inspection: From the summation of maximum weekly water temperatures at two representative points in Japan, it is apparent that during 1955 they were neither unusually high nor low and as such the activity of the drills should have been modest at worst.

Actually, the drills, while not excessively active at any time, were present at all stages of processing throughout the entire season. This was the result of three major factors. First, a typhoon during the first week of September 1954 caused nearly 500,000 strings of shell to be swept from the catching racks to the bottom. While the bulk of them were recovered within 10 days, many drills attached themselves to the seed while on the bottom. Secondly, many of the growers, due to despondency and economic pressure resulting from the poor seed crop, were less careful of drills in processing than they normally are. Third, the short crop and pressure from exporters and buyers for more seed caused many growers to process seed intended for domestic use (less carefully handled drill-wise than export seed).

In addition to the production control aspects of the inspection, approximately 2,000 cases (about 4 percent of the packed boxes) were opened and 5-10 percent of the contents examined for the presence of drills and other oyster pests or predators. In the boxes opened, Japanese drill eggs were found twice (one live batch and one hatched out) and drills twice (one live and one dead). In each instance all boxes packed on the same date as the contaminated one, as well as cases packed after that date, were rejected for export. Further operation by the guilty packing group was prohibited, though their seed could be processed through another group. A total of 397 cases of seed was rejected as a result of these findings. As a consequence of these rejections there was a considerable increase in the vigilance of responsible parties on all packing sites and a great deal of concern expressed over the stiffness of our inspection. In past years the Japanese leaders have generally tended to shift all responsibility for drill control onto the American inspector; however, in a meeting at the end of the season between officials of the Japanese Government, Miyagi Prefectural Government, growers and exporters, buyers and their representatives, the Japanese themselves actually proposed to make a greater effort to control drills. Both producers and buyers once again urged Japanese Governmental agencies to apply greater effort to drill inspection and leave the problem of quality control to the processors and purchasers.

Observations on other pests and predators such as flatworms and seaweeds were made. Spat mortalities during time on the hardening racks, processing, time on holding racks, and shipping were observed and a number of experiments conducted to empirically evaluate the losses.

A few cases were sampled on board ship after the seed arrived in the United States to ascertain the effectiveness of our inspection in Japan. No evidences of careless processing or drills were encountered in these inspections.



Virginia

OYSTER BEDS DAMAGED BY HEAVY RAINFALL IN 1955: Oyster planters in some Virginia areas the latter part of 1955 suffered heavy losses due to factors related to the excessive rainfall that accompanied the two hurricanes (Connie and Diana) in the Chesapeake Bay area on August 12 and August 17, 1955. It is estimated that about one million bushels of oysters were lost in the Rappahannock River. Similar though much lower losses were reported from the upper part of the James and York Rivers and also from certain parts of Virginia rivers tributary to the Potomac, states the November 1955 Maryland Tidewater News of the Maryland Department of Research and Education.

The August 1955 storms generally dumped about a foot or more of rain over most of the section. The most hard-hit area was the Rappahannock River, a tributary of Chesapeake Bay in Virginia. When an emergency situation was recognized, the following series of events took place: (1) the Virginia Fisheries Laboratory

worked day and night on an examination and survey of the disaster area; (2) the Chesapeake Bay Institute began a concurrent detailed investigation of hydrographic conditions; (3) a committee of well-known oyster biologists from the South Atlantic and Gulf Coasts under the chairmanship of the Oyster Institute of North America was organized to evaluate and supplement the data and conclusions reported by the above agencies.

First reports of dead oysters came from planters in the upper part of the Rappahannock River about a week after the passage of hurricane Diane. Most oyster deaths occurred suddenly on beds where the oysters had been found alive only a few days previously. Privately-planted beds, located on less suitable bottom than the natural rocks, suffered losses ranging up to almost 100 percent. Serious losses also occurred on certain natural rocks, but these were not as extensive or severe as those on planted beds.

From the large amount of data gathered it is believed that the oysters succumbed from a combination of adverse factors that developed in conjunction with the sudden and heavy fresh-water runoff. These included a marked drop in salinity; the washing of heavy accumulations of silt and organic matter into the River; and oxygen deficiency in the water that resulted from decomposition of organic matter, strong stratification, and lack of light penetration; the production from organic matter of toxic hydrogen sulphide at the bottom due to lack of oxygen; and the high summer temperatures that had increased oyster susceptibility to other unfavorable conditions that normally are present. River flow at Fredericksburg was more than twice as high as in any previous flood on record for the summer months. For two hurricanes in such rapid succession to visit this area is extremely exceptional. Cooler fall weather lowered water temperatures and produced better mixing so that the water rapidly returned to normal and the surviving oysters fattened and made good growth.



Wholesale Prices, October 1955

Changes in the wholesale fishery products price index from September to October were slight on the average. The labor-management disputes noted in September were about settled at the end of October. Seasonal changes and marketing conditions caused some marked changes in the price level of a number of items included in the fresh and frozen dressed or whole finfish subgroup. This is a normal condition at this time of the year. The over-all index of edible fish and shellfish (fresh, frozen, and canned) in October 1955 was 107.6 percent of the 1947-49 average (see table)--1.5 percent lower than in September, but 5.7 percent higher than in October 1954.



Prices for all items included in the drawn, dressed, or whole finfish subgroup index were mixed. Ex-vessel prices for large drawn haddock at Boston from September to October rose 81.7 percent, but prices quoted for the fresh-water varieties dropped substantially after the September Jewish holidays. The October 1955 prices for fresh and frozen halibut and salmon declined due primarily to the relatively large proportion of the cheaper frozen products that enter the markets with the end of the production season. Compared with October 1954, prices were higher this October for this subgroup by about 1.8 percent, with increases and decreases practically offsetting each other.

Fresh processed fish and shellfish prices from September to October were marked by only slight changes as a group. Prices for fresh scrod haddock fillets increased 30.4 percent from September to October, reflecting the seasonal increase in ex-vessel prices of drawn haddock at Boston. Prices for fresh shrimp were down 8.2 percent this October, but were 10.3 percent higher than in October 1954. Light production, due to hurricane damage, pushed shucked oyster prices up 4.8 percent from September to October and 10.0 percent above a year earlier. The fresh processed fish and shellfish subgroup index rose 1.0 percent from September to October due to higher prices for scrod haddock fillets and oysters, and the index for the subgroup was 12.7 percent above that for the same period a year earlier.

Table 1 - Wholesale Average Prices and Indexes for Edible Fish and Shellfish, October 1955 With Comparisons

Group, Subgroup, and Item Specification	Point of Pricing	Unit	Avg. Prices ^{1/} (\$)		Indexes (1947-49=100)			
			Oct. 1955	Sept. 1955	Oct. 1955	Sept. 1955	Aug. 1955	Oct. 1954
ALL FISH & SHELLFISH (Fresh, Frozen, & Canned)					107.6	109.2	111.7	101.8
Fresh & Frozen Fishery Products:					110.4	113.8	119.7	104.9
Drawn, Dressed, or Whole Finfish:					115.6	125.0	136.6	113.6
Haddock, lge., offshore, drawn, fresh	Boston	lb.	.10	.06	106.3	58.5	167.4	94.7
Halibut, West., 20/80 lbs., drsd., fresh or froz.	New York	lb.	.32	.43	99.3	133.1	106.0	98.0
Salmon, king, lge. & med., drsd., fresh or froz.	New York	lb.	.60	.63	135.1	140.4	135.4	140.5
Whitefish, L. Superior, drawn, fresh	Chicago	lb.	.65	.95	161.1	235.5	146.3	130.1
Whitefish, L. Erie pound or gill net, rnd., fresh	New York	lb.	.80	1.10	161.7	222.4	171.8	126.4
Lake trout, domestic, No. 1, drawn, fresh . . .	Chicago	lb.	.57	.60	116.8	123.0	111.7	117.8
Yellow pike, L. Michigan & Huron, rnd., fresh .	New York	lb.	.32	.90	75.1	211.0	119.6	117.2
Processed, Fresh (Fish & Shellfish):					108.9	107.8	107.3	96.6
Fillets, haddock, sml., skins on, 20-lb. tins . .	Boston	lb.	.30	.23	102.1	78.3	115.7	71.4
Shrimp, lge. (26-30 count), headless, fresh . .	New York	lb.	.55	.60	87.1	94.5	98.0	79.0
Oysters, shucked, standards	Norfolk	gal.	5.50	5.25	136.1	129.9	117.5	123.7
Processed, Frozen (Fish & Shellfish):					94.8	93.8	99.3	89.7
Fillets: Flounder (yellowtail), skinless, 1-lb. pkg.	Boston	lb.	.39	.39	102.1	102.1	102.1	98.2
Haddock, sml., skins on, 1-lb. pkg.	Boston	lb.	.27	.27	84.7	84.7	84.7	84.7
Ocean perch, skins on, 1-lb. pkg.	Boston	lb.	.27	.27	106.7	108.8	108.8	111.8
Shrimp, lge. (26-30 count), 5-lb. pkg.	Chicago	lb.	.54	.55	83.3	84.1	94.1	76.4
Canned Fishery Products:					103.4	102.7	100.3	97.3
Salmon, pink, No. 1 tall (16 oz.), 48 can/cs. . .	Seattle	case	21.70	21.70	114.8	114.8	109.6	104.4
Tuna, lt. meat, chunk, No. 1/2 tuna (6-1/2 oz.), 48 cans/cs.	Los Angeles	case	12.80	12.80	92.3	92.3	92.3	93.0
Sardines, Calif., tom. pack, No. 1 oval (15 oz.), 48 cans/cs.	Los Angeles	case	7.55	7.55	88.1	88.1	88.1	2/
Sardines, Maine, keyless oil, No. 1/4 drawn (3-1/4 oz.), 100 cans/cs.	New York	case	8.20	7.70	87.3	81.9	79.3	74.0

^{1/}Represent average prices for one day (Monday or Tuesday) during the week in which the 15th of the month occurs. These prices are published as indicators of movement and not necessarily absolute level. Daily Market News Service "Fishery Products Reports" should be referred to for actual prices.

^{2/}Not available.

Frozen shrimp prices dropped 1.0 percent from September to October, while prices for frozen fillets were about unchanged. The October 1955 index for frozen processed fish and shellfish was 1.1 percent higher than September and 5.7 percent higher than a year earlier. When compared with a year earlier, October 1955 prices for flounder fillets and shrimp were higher, while shrimp and fillets of ocean perch were lower.

Higher canned Maine sardine prices were responsible for the rise of 0.7 percent in the subgroup index for all canned fish from September to October. Canned

fish prices in October 1955 were also higher (6.3 percent) than the same month a year earlier with prices for salmon higher by 3.8 percent and for Maine sardines up 18 percent. Canned tuna prices and California sardines were about unchanged.



REPRODUCTION OF FISH SUBJECTED TO ELECTRIC CURRENT

The possibility that fish might become sterile as a result of being subjected to electric current has interested many fishery biologists and fish culturists. As part of a fishery-management and research program on strip-mine impoundments, sponsored by the Truax-Traer Coal Company of Fiatt, Ill., a study was begun on the effect of electrofishing gear upon the reproductive capacity of the largemouth bass (Micropterus salmoides).

The plant was a 2,500-watt, 230-volt alternating-current unit. The electrode system was formed by 2 plates of aluminum wrapped around 2 boards that were 8 feet long. These electrodes were mounted about 10 feet in front of the boat and were about 6 feet apart.

On July 2, 1952, 8 largemouth bass, their total lengths ranging from 10 to 14 inches, were completely stunned by the electric current and collected with dip nets. The bass were transported to a spawning pond that contained no other fish. All specimens had completely recovered by the time they were released; they suffered no apparent harm from the electric current or from the handling.

On September 13-14, 1953, this pond was drained and the fish were removed. In addition to the 8 brood bass, there were 4,266 largemouths that were 2 to 8 inches in total length. Approximately 96 percent of these were less than 5 inches in total length, and approximately 4 percent were 5 to 8 inches in total length. The brood bass were 12 to 15 inches in total length. All fish removed were in good condition.

Although this investigation should be repeated with other species in addition to the largemouth bass in order to obtain more conclusive data, in this particular case the fish were definitely not made sterile by the electric current.

--Progressive Fish Culturist, July 1954.



International

NORTH PACIFIC FISHERIES COMMISSION

TOKYO MEETING REPORT: A stepped up study of the origin and distribution of Pacific salmon was scheduled for next year by the International North Pacific Fisheries Commission at its meeting in Tokyo which ended on November 5, 1955.

The United States Section of the Commission on November 8 issued this report to the press:

A large increase in scientific studies to determine origin and distribution of Pacific salmon in the sea was decided upon by the United States, Canada, and Japan at the October 31-November 5 meeting of the International North Pacific Fisheries Commission in Tokyo, according to the United States Section and their advisers.

The United States Section for its part decided upon increased emphasis on ocean tagging as one of the lines of investigation offering good prospect of an early answer to the paramount problem, which is: determination of the origin and distribution of the salmon of the Pacific.

At the same time the United States Section will continue other scientific studies seeking to distinguish American and Asiatic salmon: research fishing and sampling to determine distribution of the salmon in the sea; study of racial characteristics which may reveal physical differences; oceanography studies to ascertain the effect of currents, temperature and the food supply of fishes, as it relates to the distribution of fish in the sea.

Concern of American people over recent trends in yield of Pacific salmon was emphasized to the International Commission at its first meeting by Milton Brooding, Chairman of the United States Section, who said in addressing the Commission:

"The people of my country are greatly concerned with the seaward migration of stocks of salmon of North American origin and we are moving as rapidly as possible in the direction of determining the ocean distribution of these stocks. We know they leave our shores after being spawned in our streams, and, we know that an important part of their life cycle is spent in the open sea. Further, we know that these fish are capable of migrating long distances. During the season just passed the United States catch has been extremely poor, with some runs a complete failure. In view of these facts, it must be obvious that our people are greatly concerned about what happens to these salmon during their sea life.

"So it is we come here today, greatly concerned because of the apparent loss of our fish in the open sea. This loss will affect salmon runs to come because without adequate present spawning in our American streams there will be inadequate future stocks to perpetuate the fishery."

While the 1956 operating schedule is not yet definite, Japanese spokesmen have indicated they would not expect to increase the number of vessels engaged in salmon operations in the Aleutian area in 1956. This position is a question for future discussion in line with the United States Section's great concern as expressed in its opening statement. The Japanese spokesmen did indicate a probable increase in operations for both salmon and crab in the Okhotsk Sea area, which is west of the Kamchatka Peninsula.

With regard to Japanese North Pacific operations during the 1955 season, the United States Section was informed that the Japanese had adhered strictly to their treaty assurances, and that in fact they had not fished within 7° of the area within which they had agreed to abstain from fishing salmon. While their operations began at 178° east longitude, the Japanese took the great majority of their 1955 catch from waters west of Attu, beyond the utter extremity of United States territory in the Aleutians.

Salmon sampling operations to determine distribution as distinguished from fishing for tagging purposes will also be substantially increased by all three nations party to the treaty.

Research fishing to provide racial samples and other scientific data will be conducted throughout the Bering Sea by United States and Japanese vessels, with some overlapping in the central part of the sea.

Vessels of three nations will conduct simultaneous fishing operations for scientific samples of the salmon population in a broad band all the way across the Pacific. The Americans and Canadians will work westward and the Japanese east, with sufficient overlapping to confirm the data developed. It is possible that United States and Canadian commercial fishing vessels will encounter Japanese research craft fishing for scientific samples in the area of overlap.

The increased emphasis on tagging, which received priority in the research program of the United States Section, was decided upon because of the encouraging results obtained in 1955 tagging work.

The tagging program was developed for the United States Section by W. F. Thompson, Director of the Fishery Institute of the University of Washington, which conducted the tagging investigation in 1955.

It is planned to tag large numbers of salmon in a broad band along both sides of the Alaska Peninsula and the Aleutian Islands, and extending if possible to the area of the Japanese pelagic fishery. In order to provide fish in physical condition to stand tagging and survive, specially adapted purse seines will be the principal fishing gear employed. Experimental work is continuing to develop improved tags, methods of tagging, and the technique of taking fish for tagging on the high seas.

The United States Section initiated a request that the nations concerned begin at once studies which will permit decision in 1958 on the qualification of fisheries for abstention under the fundamental principle of the Treaty. This United States proposal was accepted by the Commission.

Attention was given to the king crab resource and the continuance of scientific studies for its conservation.

Edward W. Allen, one of the four United States Commissioners, was elected chairman of the Commission for 1956; George R. Clark of Canada was chosen Vice President, I. Fujita of Japan, Secretary. This was in line with the practice of rotating these offices between the three nations. The next meeting will be held in Seattle in November 1956. The Biology Committee of the Commission, which is charged with attempting to determine the distribution of North American and Asiatic stocks of salmon on the high seas, will meet at Honolulu on February 6 and again at Seattle on November 5, 1956, the United States Embassy at Tokyo reported on November 10.

Most United States studies will be made by the U. S. Fish and Wildlife Service and the Fisheries Institute of the University of Washington. The California Department of Fish and Game is cooperating by furnishing data already gathered.

INTERNATIONAL COUNCIL FOR THE EXPLORATION OF THE SEA

ANNUAL CONFERENCE: The annual conference of the International Council for the Exploration of the Sea was held in Copenhagen October 24-November 11, 1955. The following member countries sent delegates: West Germany, Belgium, Denmark, Spain, Finland, France, Great Britain, Eire, Iceland, Norway, Netherlands, Portugal, and Sweden. Although not a member, the United States was represented by an observer, Andrew W. Anderson of the U. S. Fish and Wildlife Service.

The U.S.S.R. and Poland sent sizable observer teams to this year's conference. Reportedly, these teams contributed to the discussions and created the general impression that fisheries methods and research in those two countries have not lagged significantly behind developments in the West. It was also announced at the end of the conference that both the U.S.S.R. and Poland had applied for and been accepted as members of the Council.

The Council elected a Norwegian, H. W. Sverdrup, as President to replace the outgoing M. A. Dobson of Great Britain, a November 7 dispatch from the United States Embassy at Copenhagen reports.

TERRITORIAL WATERS

BRITISH-ICELANDIC NEGOTIATIONS ON ICELANDIC TERRITORIAL FISHING LIMITS: Negotiations between Great Britain and Iceland that have been afoot through the Organization for European Economic Cooperation for a settlement of the dispute regarding territorial fishing limits unilaterally imposed by Iceland have failed, states the October 28 issue of *The Fishing News*, a British fishery periodical. The last week in October an additional memorandum of some 26 pages in length was issued by the Icelandic Government. This was in reply to the British Government's 6,000-word memorandum issued by the British Foreign Office in May 1955 for the Council of Europe to which body the Icelandic Government had earlier submitted a complaint in a lengthy memorandum regarding its inability to market Icelandic fish in Great Britain.

The Icelandic Government's new statement comprises an introductory section, a section emphasizing the importance of fishing to Iceland, its view of the legal

position in relation to fishing limits, the claimed effects of its conservation policy, and lastly, a section complaining of the action taken by the British fishing industry.

NORTH PACIFIC OCEANOGRAPHIC SURVEY

OCEANOGRAPHIC STUDIES AID FISHERIES: Scientists of Canada, the United States, and Japan with more than 50 ships at their disposal have just completed a four-month survey of the North Pacific which is expected to make navigation safer, help develop marine resources, and aid Japanese farmers. The scientists of the three countries will meet in Hawaii in February 1956 to compare notes and assess the information obtained.

The survey charted for the first time the circular movement of Pacific waters north of 20 degrees north latitude. It was the first of an annual series. Another joint survey series by the United States, Japan, and Peru will begin in August 1956 and will cover equatorial waters between 15 degrees north latitude and 10 degrees south latitude.

Data collected this year included the temperature, salinity, and oxygen content of ocean currents to a depth of 500 fathoms. Plankton concentrations and fish distribution were also noted. Meteorological observations and findings on the relationship between the "Oyashio," or cold current running south; the "Kuroshio," the warm current running north; the North Pacific current, and the California current were recorded. Although details were not disclosed, it was said that the observations solved the riddle of the unseasonable cold wave and abnormally warm winter of 1953/54 in Japan. Better weather forecasts will now minimize damage to crops in northeastern Japan by cold waves.

East of 175 degrees west latitude and south of the Aleutian Islands the survey was conducted by ships of the United States and Canada, while Japan covered the remaining waters to the west.

Cooperating organizations were: for Japan, the Maritime Safety Board, Tokyo College of Fisheries, Hokkaido University, Central Meteorological Observatory, Kagoshima University, and the Togai District Fisheries Institute; for the United States, the University of California, Pacific Fisheries Institute, and Washington University; for Canada, the Fisheries Board, Pacific Institute, and Asia-Pacific Observation Group.

WHALING

WHALERS PAY RATES INCREASED: The National Whaling Board has approved a six-percent increase in pay, bonus, and overtime rates for the 1955/56 whaling season, states The Fishing News (November 4, 1955), a British fishery periodical. This is the same increase as that negotiated between the Norwegian whaling companies and unions.

The Board comprises representatives of the British and South African whaling companies, the Navigators' and Engineer Officers' Union, and the National Union of Seamen.

FOOD AND AGRICULTURE ORGANIZATION

REPORT ON EIGHTH SESSION OF FAO CONFERENCE: The Eighth Session of the Conference of the Food and Agriculture Organization opened on November 4, 1955, in Rome, Italy. The Conference which is the chief legislative and policy-making organization of FAO (of which the United States and 70 other countries are members), was opened by the Director-General who referred to the work that had

been done by FAO in its first ten years, but he said, rather than look nostalgically to the past, it was better to look forward to the next decade and prepare to tackle the immense amount of work which was waiting to be done.



After three weeks of meetings on world problems in agriculture, forestry, fisheries, and nutrition, the Eighth Session of the Conference terminated November 25, 1955. During this period the member countries celebrated the tenth anniversary of FAO's founding in Quebec, Canada, 10 years ago.

Advisers to the United States delegation at the Conference include A. W. Anderson, Chief, Branch of Commercial Fisheries, Fish and Wildlife Service, U. S. Department of the Interior, and Charles E. Jackson, General Manager, National Fisheries Institute, Washington, D. C.

The Director of the Economics Division at the first meeting of the Commission-of-the-Whole on November 8 gave his statement on the "The World Food and Agricultural Situation" (Document C 55/CW/2). After referring to the printed document, the State of Food and Agriculture (C 55/4), which reviewed developments over the last decade, he pointed out that the present situation had not changed fundamentally since the 1953 Conference. Although there were some surpluses and stockpiles were growing, the per capita production of food in the world had not risen much because the purchasing power was not available.



Technical Committee on Fisheries meeting. Representatives of 29 countries and an observer from UNESCO attended.

After analyzing various factors concerned with production, distribution, marketing and consumption, stabilization of prices, and increase of farm incomes, etc., the Director of the Economics Division brought out the following as policies which the Conference should consider: (1) increased consumption; (2) reduced costs; (3) greater flexibility of production; (4) greater stability of prices; (5) increase in farm incomes; and (6) disposal of surpluses to speed economic progress in underdeveloped countries, without disturbing normal trade in those products.

The Director-General on November 11, in a comprehensive statement to the Commission-of-the-Whole, explained the factors which had influenced his decisions with regard to the 1956/57 Budget and the Management Survey Report. In making his decisions on the budget, he had kept very clearly in mind the principles on which the Organization was founded, and, in considering future budgetary requirements, had used the 1955 Program as a basis.

At the eleventh meeting of the Commission-of-the-Whole, the Chairman pointed out that delegations had suggested that special attention should be paid by FAO to practical field studies, particularly to work directed primarily towards improving production, such as plant protection, regional conferences, training centers, storage facilities, and desirable developments in fisheries, animal husbandry, and horticulture. Some delegations had emphasized work in nutrition and home economics. Regarding new activities, many countries felt the proposed survey of world resources would help in developing national programs.

TECHNICAL COMMITTEE ON FISHERIES: Fishery problems were initially discussed in a Technical Committee on Fisheries. Representatives of 29 countries and an observer from UNESCO attended the meetings of the Committee. A. W. Anderson, Chief of the Fish and Wildlife Service's Branch of Commercial Fisheries, and Charles E. Jackson, General Manager of the National Fisheries Institute, Washington, D. C., served as United States representatives on the Committee.

The first meeting of the Technical Committee on Fisheries of the Eighth Session of the Conference was held on November 15. The agenda of the Technical Committee on Fisheries included the organization of the Committee; adoption of an agenda; review of the activities carried out by the FAO Fisheries Division during 1953/54-1954/55, program of work for 1956/57, including the item on the agenda of the Commission on Program Trends and Policy Questions, i.e., "The Rational Utilization of the Living Resources of the Sea (in cooperation with the United Nations Organization)."

At the First Meeting of the Commission on Program Trends and Policy Questions on November 15, the chairman proposed that the item on the "wise utilization of the living resources of the sea" should be referred to the Technical Committee on Fisheries to deal with initially, and the Committee should refer the item back to the Commission on Program Trends and Policy Questions should any specific policy matters arise.

New FAO Fisheries Program: The Committee was in general agreement with the conduct of past programs by the Fisheries Division of FAO and also concurred with the program proposed for 1956 and 1957 although it was necessary to indicate some items which could be delayed if the full budget allotment was not received. FAO had proposed about a 17-percent increase over its current budget but the final increases approved were about 10 percent for 1956 and 13 percent for 1957. However, the technical divisions--fisheries, forestry, agriculture, economics, and nutrition--will be able to carry on most of the work proposed as the greater share of the deductions were made in other parts of FAO's operations.

The Technical Committee on Fisheries gave the highest priority to work in the technological fields of production, processing, gear development, and fishing-boat design. It endorsed holding of an

international Gear Congress early in 1957 and a repetition of the very successful Fishing Boat Congress (first held in 1953) probably early in 1958.

Economics and Statistics activities also were highly commended and it was regretted that a scarcity of well-qualified economists was hindering the more rapid advancement of the program in this field. The publications were mentioned as proving extremely useful to the member countries. A series of ten proposed economic studies, including such subjects as governmental services to the fishing industry, fishery cooperatives, marketing, etc., were looked forward to with great interest. The first report, a pilot study on governmental services to the sea-fish industry of Great Britain is well under way and is expected to set a pattern for other countries and other studies.

Fishery biology activities deemed most significant were in the establishment of a common terminology and a standardization of research methods.

In general, the Committee suggested that regional activities be strengthened. It also commented most favorably on the Expanded Technical Assistance Program, a field which supplements the Regular Program, and one in which the Fisheries Division appears to have made a very good record of accomplishment.

Of the new activities proposed for initiation, the Committee recommended that these must take a lower priority than items in the Regular Program. Some concern also was expressed over the danger of spreading the Division's facilities and personnel too thin, especially since it is subject to requests for assistance from over 70 nations in all parts of the world. In accordance with the above recommendation, it was agreed that the suggested new activity involving a survey and appraisal of world agricultural, fishery, and forestry resources in relation to needs would be delayed or curtailed as required.

Substantial savings were made by eliminating provisions for meetings and consultations which it was thought would arise out of the International Technical Conference on the Conservation of the Living Resources of the Sea, convened by the United Nations at FAO headquarters in Rome from

April 18 to May 10, 1955. There appeared to be no need for the Fisheries Division to undertake such an activity. Similar savings were made by eliminating a requested post in the FAO Legislative Service to undertake special work on questions of international law affecting fisheries.

A suggestion in an FAO paper entitled "Role of FAO in the Development and Wise Utilization of Sea Fisheries" that FAO become active in the development of scientific criteria required to determine the need for conservation action, the appropriateness of measures to be adopted, and the effectiveness of these measures, particularly to furnish guidance to such arbitral commissions or other organs as might be established in accordance with the Draft Provisional Articles con-

Report of the Technical Committee on Fisheries: The Conference examined the results achieved in fisheries during the past two years as well as the program of work proposed by the Director-General for the next two years. It commended the Director-General upon the achievement of a program which was well conceived and properly balanced. It felt that future trends in the work on fisheries should be based upon the logical development of the present structure. It noted the necessity for strengthening the staff in order to implement the projects in the 1956/57 program and approved the measures suggested to accomplish this purpose.

It was felt particularly desirable that projects should continue to be undertaken which were consistent with the status of the Organization as an international body and that Member countries should continue to be encouraged to undertake work which could more appropriately be done nationally.

It was considered that, among the activities to be conducted under the Regular Program, those now in progress deserved the highest emphasis and that the danger should be avoided of spreading too few staff over too diverse a range of activities. Importance was attached to the concurrent development of production, processing, distribution and marketing in the domestic fisheries.

The Conference wished to draw special attention to the following aspects of the program of work for the next two years:

FISHERIES BIOLOGY: In the field of fisheries biology, the Conference considered that the establishment, first of all, of a common terminology and, secondly, a standardization of research methods deserved emphasis and that the initiative which had already been displayed in this direction must be commended. Such standardization of terms and methods was necessary in order that any one country might utilize the work done by other countries. It was regretted that it had not been possible to continue the work of preparing the schedules of scientific and common names of commercial species of fish since these contributed to the establishment of a common terminology.

The strengthening of the staff proposed to further the work of standardization and to assist in the preparation of a series of handbooks was considered desirable. It was thought that these handbooks should be compiled wherever possible by the Member countries and that the Organization would be mainly responsible for editorial work.

It was pointed out that the work on terminology undertaken in the field of biology was important both to UNESCO

concerning the High Seas as proposed by the International Law Commission, met with unanimous opposition. It was recommended that nothing be initiated in this field by FAO until the need for further guidance in such matters was more apparent.

The Conference accepted all of the recommendations originating in the Technical Committee on Fisheries. They will, therefore, guide the program of the Fisheries Division for 1956 and 1957.

Copies of the Report of the Technical Committee on Fisheries and the statement with regard to The Rational Utilization of the Living Resources of the Sea follow:

and to the Organization and, while the latter should play its full part in this, it was essential that close contact be maintained with UNESCO in its development. The coordination of work in the classification of plankton was noted and considered essential to the development of the fisheries.

FISHERIES TECHNOLOGY: The Conference fully endorsed the work carried out in the field of fisheries technology, including the strengthening of the staff. The method of presentation of the work in this field was approved and recommended for wider adoption.

It was noted that since the last Session of the Conference the gratifying results of the Congress on Fishing Boats held in Paris and Miami in 1953 had become fully apparent and stress was laid upon the desirability of a second Congress. If possible, this should be organized in three sessions in the Far East, America, and Europe and it was agreed that the feasibility of holding it simultaneously with the proposed congress on fishing gear and methods should be examined. It was hoped that the Organization would be able to promote a permanent international body to cooperate in the improvement in the design of fishing boats. At the same time the Organization should continue to take all possible steps to ensure the adequate circulation of information on fishing boat design. It was recommended that the staff of the Organization be strengthened to assist in this work in future and that if, in the meantime, savings were achieved in other directions they should be allocated to furthering work in this field.

The proposed congress on fishing gear and methods was considered to be of the highest importance. It was particularly requested that, since many of those likely to benefit by the proceedings would not be able to attend such a congress, wide dissemination of the information arising out of it should be made in forms appropriate to fisheries workers at all levels.

The collaboration with UNICEF on technological problems in the manufacture of fish flour was noted and the continuation of this work during 1956 and 1957 was approved.

FISHERIES ECONOMICS AND STATISTICS: The Conference approved the strengthening of the staff in the field of fisheries economics and hoped that this would permit further broadening of its activities. The Conference noted that the work was hindered by the scarcity of well-qualified economists conversant with conditions in the industry, and that this impeded the execution of projects in both the Regular Program and ETAP. The policy of employing on fisheries studies consultants from Member countries already engaged on similar or associated work was noted and highly

commended as a method of accomplishing a great deal of useful work at a minimum cost to the Organization. This policy, moreover, assisted in focusing the attention of prominent economists and administrators on the problems of the fishing industries, and their assistance could be expected to make important contributions towards the solution of such problems. The pilot study on governmental services to the sea-fish industry of Great Britain, at present being carried out in the United Kingdom, was considered to be useful both in itself and in setting a pattern which would be valuable when similar work relating was undertaken in relation to other countries. The Conference noted that until additional staff became available, work on economic appraisal in fisheries could be carried out on an *ad hoc* basis only.

It was considered that the publications of the Organization in the field of fisheries economics were proving extremely useful to Member Nations, and particular mention was made of the Yearbook of Fishery Statistics. It was recommended that standardization should be carried further and the Director-General was asked to draw the attention of Member countries wherever possible to the most desirable forms in which statistical returns might be compiled so as to provide a useful basis of comparison with those of other countries.

REGIONAL ACTIVITIES: Asia and the Far East: In reviewing the fisheries work accomplished by the Organization in Asia and the Far East, the Conference noted the consistent growth and development of the Indo-Pacific Fisheries Council over the past years. It felt that the work devolving upon the Secretariat in connection with the Council and the associated work in the Regional Office had now become so onerous that the Regional Office fisheries staff should be reinforced by an officer at an early opportunity.

One of the accomplishments of the Indo-Pacific Fisheries Council had been the strengthening of fisheries administration in the region. It was also considered that means should be found to develop leadership among communities of fishermen and that the appointment of an additional officer to the Regional Office would strengthen these activities. At the same time it was recognized that, however many persons were attached to the Regional Office, specialized advice was required from Headquarters from time to time. Visits from Headquarters staff had proved extremely valuable and it was only regretted that very often these were of comparatively short duration. It was recommended that Headquarters officers be assigned for longer periods to the Regional Office in order that they could the better cover the very extended area and diversity of conditions in the region. For this reason the Conference welcomed the increased allocation for travel proposed for work in this field in 1956/57. It was felt that a prerequisite of expert advice was familiarization of the officer with local conditions in the part of the world in which he was working.

The attention of the Conference was drawn to the existence of certain publications, at present available only in Japanese, which might be of benefit to other countries where the fishing industries operated under similar conditions, but it was recognized that considerable difficulties in translation would have to be overcome before this work could be undertaken.

Europe and the Middle East: The conclusion was reached that, as in Asia and the Far East, the work of the Organization generally in the area as well as that of the Secretariat of the Regional Council should be strengthened and extended. It was noted that the General Fisheries Council for the Mediterranean afforded the means of carrying out co-ordination of work being done by a number of governments and institu-

tions in the region to ensure standardization wherever possible. The Conference fully endorsed this line of approach.

Latin America: It was hoped that the Director-General would pay full attention to the importance of promoting the production of fish flour in the Central American countries and that specialized advice and assistance would be given on this project wherever possible. The importance to this area of the survey of resources was stressed and it was considered that the early formation of the proposed Fisheries Commission for Latin America (FCLA) might contribute much to fisheries work in that region.

TECHNICAL ASSISTANCE ACTIVITIES: The Conference recorded its appreciation of the Technical Assistance work carried out in fisheries. Much of this field work was directed towards immediate practical objectives and, by its nature, required continual guidance from Headquarters. The Conference felt that there should be an appropriate balance between the effort put into the Regular Program activities and the Technical Assistance work since the latter was dependent upon the Regular Program and both programs were mutually beneficial. The expansion of the Technical Assistance Program was approaching the limit which could be conducted by the existing and proposed Regular Program and Headquarters Technical Assistance staff. It was recognized that recruitment of experts to fit the particular posts required by requesting countries presented difficulties peculiar to the field of fisheries.

The systems of training were specially mentioned and the Conference hoped that it would be possible to hold a training center on fish processing technology in Latin America in 1956.

PUBLICATIONS: The publications program for 1956/57 was approved, including the provision made for revising the Handbook on World Fisheries Abstracts. The Abstracts were considered to be most useful in both practical and research work. It was noted that the sales of fisheries publications had been substantially increased, thus fulfilling the hopes of earlier sessions of the Conference. In this connection, the system adopted in the past two years of sending out press releases to fisheries journals all over the world relating to items of particular news value contained in the Organization's fisheries publications was noted and it was considered that these releases served an extremely useful purpose, were widely used and should be continued.

The Rational Utilization of the Living Resources of the Sea: The Conference noted with interest that the wise utilization of the living resources of the sea and particularly the conservation of such resources was subject to consideration by intergovernmental and international bodies. It recalled that in Article I of its Constitution, the Organization had been charged, *inter-alia*, with promoting and, where appropriate, recommending national and international action with respect to the conservation of natural resources. It considered that in the discharge of this function as regards the living resources of the sea the Organization might collaborate with existing bodies. It noted with satisfaction that the Director-General had been able to provide assistance to the United Nations in the preparation and conduct of the International Technical Conference on the Conservation of the Living Resources of the Sea held in Rome, in April 1955. The Conference was of the opinion, however, that, whilst the Organization will continue the more general program of developing the scientific basis of wise utilization of living aquatic resources, the promotion and development of the scientific criteria, which could be used to guide such arbitral commissions and other organs as might be established in

accordance with the Draft Provisional Articles concerning the High Seas as proposed by the International Law Commission in respect of judgements relating to conservation

Technical Assistance in Fishery Development: A review of FAO technical assistance in fishery development was presented to the Technical Committee on Fisheries. The review pointed out that while the type of assistance given to governments by experts varies from country to country, over-all during the past five years such assistance was rendered in eight fields of endeavor, and was about equally divided among them. These are as follows:

1. Assessment and management of fishery resources (marine and inland). Projects in this field have been conducted in such countries as Brazil, Chile, Costa Rica, Curacao, Ecuador, Finland, Iraq, Israel, Libya, Panama, Paraguay, Turkey, and Yugoslavia.
2. Experimental fishing in Iran, Iraq, Saudi Arabia, Somalia (Italian), and Turkey.
3. Development of a fishery resource, or the establishment of a pond fish industry in Burma, Ceylon, the Dominican Republic, Guatemala, Haiti, Honduras, India, Iran, Iraq, Jamaica, Nicaragua, Thailand, and Yugoslavia.
4. Design, mechanization, and development of fishing craft and gear in Brazil, Ceylon, Chile, Haiti, India, Liberia, Sudan, West Pakistan, Yemen, and Yugoslavia.
5. Marketing facilities in Chile, Ecuador, East and West Pakistan, Mexico, and India.
6. Fish distribution in Chile, Mexico, Turkey, and Yugoslavia.
7. Fish-preservation and processing in Brazil, Chile, Ecuador, Finland, India, Liberia, Yugoslavia, Thailand, and Turkey.
8. Fisheries administration (including establishment of statistical services) in Brazil, Burma, Colombia, Egypt, Finland, and Syria.

The FAO/TA program for 1956, as now before TAB and TAC, makes provision for 92 fishery posts in three categories, 78 of which have already been approved for Category I, compared with 60 fishery posts in 1955.

The 1956 program also will include one training center; and probably two. Also provision is made for about 14 fellows in Category I, compared with 14 in 1955 (28 further fellowships are provided in lower categories); and for some equipment for the experts and centers, probably around \$50,000. The over-all budget for fishery projects in 1956 will be in the neighborhood of \$800,000, compared with \$650,000 in 1955.

The types of fishery assistance to be rendered in 1956 will be in the same general fields as heretofore, with likely more emphasis on basic reconnaissance surveys in some countries to determine what types of technical assistance would be most useful to governments in the future. Heretofore,

measures, should not be initiated by the Organization until the need for further guidance in these matters was more apparent.

fishery officers of the FAO regular staff have made a large contribution in this connection. But with the greatly increased work load at Headquarters, because of an increase in Regular Program work as well as the Technical Assistance work, this has become limited.

In conclusion, the review stated: "You have probably been waiting for some news about accomplishments; in other words, of what value has this TA work been in reaching the objectives set forth five years ago: I wish I could tell you that fish production has been greatly increased and therefore people have much more food to eat; and that living standards have been raised over wide areas. But I regret that I can tell you none of these things. True, progress has been made in some sectors. Some fishermen have been shown and have adopted new fishing methods which catch more fish, improved fish cultural practices have increased fish populations, new fishery resources have been created through pond culture, biological programs have been started and are being carried forward, fish processing techniques have been improved, and fish marketing is conducted in a more orderly manner. But all in all, only a start has been made. Miracles cannot be expected overnight. It took 25 years to really establish a frozen food industry in the United States. It took years of research to manage effectively the halibut fishery of the Gulf of Alaska. Equally, it will be as many years before enduring results are apparent from TA work. Too many people need teaching and too few experts are provided or are available. It is a long-term program. The real hope for the future lies, therefore, in continuity of effort...."

OTHER ITEMS OF INTEREST: Atomic Energy: Peaceful Uses of Atomic Energy for Agriculture and Food Production was an agenda item discussed at the twelfth meeting of the Commission on Program Trends and Policy Questions. It was pointed out that there were serious problems concerning the peaceful uses of atomic energy, such as radio-active isotopes in the field of agriculture, fishery and food processing, and that FAO would be asked to participate in solving these problems.

Food Surpluses and Scarcity: FAO Director-General P. V. Cardon told the Conference that while technical aid has helped many countries improve production and distribution, we are simultaneously oppressed by problems of surpluses and scarcity and that the gap between the fortunate and less-fortunate countries appears still to exist and, in fact, even tends to widen.

The Director of FAO's Economics Division, in discussing the state of food and agriculture, said that short of drought or natural disaster, the potential production for the world as a whole is likely to be in excess of demand during the years immediately ahead. This leads to two conclusions, he continued. First, that if we are to make headway toward the FAO objectives, governments must give the same attention in the future to expanding consumption as they had given in the past and must continue to expanding production. Second, we must

achieve greater flexibility of production so that we can produce what can be sold, where it can be sold, and can avoid further overproduction of commodities of which we already have too much.

United States Congressman Clifford R. Hope of Kansas told the opening session of the Conference that the most serious problem in the world's food and agriculture situation is no longer production, but the exchange and distribution of food. He said, "In the years immediately ahead the major emphasis should be on the fundamental economics involved in the distribution of food."

Oceanography: UNESCO's Observer on November 16 before the Technical Committee on Fisheries discussed UNESCO's policy in the preparation and implementation of its program relative to marine sciences and described briefly the evolution and prospects of this program, which is being undertaken in close collaboration with FAO.

UNESCO's action in this field is based on two principles. (1) an increased knowledge of oceanographical phenomena requires basic research which, by its nature, is impracticable without international collaboration; (2) in order that this fundamental research yield practical results capable of contributing to the economic development of the regions concerned, UNESCO's program must be directed in such a way as to give to FAO such scientific services as it may need in order to develop rationally the resources of the sea. We are therefore relying mainly on FAO to indicate in what direction it thinks that scientific research should be encouraged and co-ordinated. That is why we

have considered this program right from the start as being a joint program.

In May of this year, an experts' meeting was held at FAO Headquarters in order to elaborate a proposed statute for the Consultative Committee on Marine Sciences, with the mission of advising the Director-General of UNESCO on all questions that he might put concerning the development of international collaboration in this field and, insofar as it is related, of limnology and of the elaboration and implementation of research plans within the framework of the UNESCO program. The Committee will consist of nine members appointed by the Director-General of UNESCO and chosen from amongst an international panel of consultants formed in collaboration with FAO, on maritime meteorology, physical and chemical oceanography, marine biology, submarine geology and topography, and related questions of limnology.

The proposed statute is being submitted for the approval of the Executive Council which is at present holding its 42nd session in Paris.

An interim committee of the future Consultative Committee met last month in Tokyo,

The recommendations of the interim committee are at present being studied by the secretaries of the two Organizations and include, amongst other items, the organization of a joint FAO/UNESCO meeting on the "Productivity of the Sea," as well as the production, in collaboration, of a directory of institutions engaged in marine sciences research.

CARIBBEAN COMMISSION MEETS

The Twenty-First Meeting of the Caribbean Commission was scheduled at Aruba, Netherlands Antilles, December 5-12, 1955, the U. S. Department of State reported early in December.

The Caribbean Commission (an international advisory body resulting from expansion of the original Anglo-American Caribbean Commission) serves to coordinate activities of the four member governments, France, Netherlands, the United Kingdom, and the United States, in their efforts to improve the economic and social well-being of Caribbean inhabitants.

Among the principal items for discussion at the Twenty-First Meeting of the Commission will be the Second Caribbean Fisheries Seminar.

NORTH PACIFIC FUR SEAL CONFERENCE MEETS

The United States Government was represented by the following delegation at the North Pacific Fur Seal Conference which opened at Washington, D. C., November 28, 1955:

DELEGATES: The Honorable Wesley E. D'Ewart, (Chairman)
Assistant Secretary of the Interior.

William C. Herrington, (Deputy Chairman)
Special Assistant for Fisheries and Wildlife,
Office of the Under Secretary, Department of State.

Arnie J. Suomela, Assistant Director,
Fish and Wildlife Service,
Department of the Interior.

ADVISERS: Douglas G. Chapman, Professor,
University of Washington, Seattle, Wash.

- ADVISERS: (Contd.) Warren F. Looney,
Office of the Special Assistant for Fisheries
and Wildlife, Department of State.
- Conrad E. Snow,
Assistant Legal Adviser for Far Eastern
Affairs, Department of State.
- William M. Terry,
Fish and Wildlife Service,
Department of the Interior.
- Seton H. Thompson,
Chief, Branch of Alaska Fisheries,
Department of the Interior.
- Ford Wilke,
Biologist-in-Charge, Fur Seal Investigations,
Department of Interior, Seattle, Wash.
- Raymund T. Yingling,
Assistant Legal Adviser for European Affairs,
Department of State.



From 1911 to 1941 the seal herds were protected by the fur-seal treaty signed in 1911 by the United States, Great Britain, Japan, and Russia. So successful was this treaty in rehabilitating the seals that in 1941 Japan, as permitted by the treaty's provisions, terminated it on the ground that the animals had become so numerous as to harm Japanese fisheries. Since 1942 the United States and Canada have by agreement protected the Pribilof herd in the Northeastern Pacific waters. The purpose of the coming conference will be to extend multilateral protection again over all fur seals of the North Pacific, the U. S. Department of State announced on November 25.



Australia

EXPORTS OF SPINY LOBSTER TAILS: Exports of spiny lobster tails from Western Australia point to a significant drop in the number of mid-gets exported during 1954/55, compared with 1953/54 (see tables 1 and 2). A small increase in the percentage of small-medium tails exported this year is also indicative of better stocks.

Table 1 - Australian Exports of Spiny Lobster Tails,
November 1954 - April 1955

Size	Western Australia	South Australia	Tasmania	Total
	(Pounds)			
Midget (under 6 oz.)	377,220	25,065	25,035	427,320
Small (6-8 oz.)	957,695	67,495	44,700	1,069,890
Medium (8-12 oz.)	699,530	93,935	84,995	878,460
Large (12-16 oz.)	468,040	62,395	52,110	582,545
Jumbo (over 16 oz.)	118,390	35,050	64,565	218,005
Total	2,620,875	283,940	271,405	3,176,220

For Western Australia from the percentage of tail weight by grade it is significant that there has been an increase in the medium-grade tails as compared with the previous year. This increase however, is due partially to the change in weights of grading tails for export. The medium grade was previously from 9-12 oz., now it is 8-12 oz., inclusive. Thus from first observations it would appear that the state of the stocks has greatly improved. This may not necessarily be the case. However, the fall in the number of midgets being processed in Western Australia suggests that there has been an improvement in the stocks, according to the August 1955 Australian Fisheries Newsletter.

Assuming that production from South Australia and Tasmania remains about the previous year's figure, exports from Australia should approximate 4.4 million

Table 2 - Percentage Comparison of Australian Spiny Lobster Tail Exports by Size

State & Year	Midget	Small	Medium	Large	Jumbo	Total
	(Percent)					
Western Australia:						
1954/55	14.4	36.5	26.7	17.8	4.6	100
1953/54	19.1	37.3	24.4	16.2	3.0	100
Tasmania, 1954/55	9.2	16.5	31.3	19.2	23.6	100
South Australia, 1954/55	8.8	23.8	33.1	22.0	12.3	100

pounds in 1955 and be worth US\$3.75 million. This is roughly US\$0.25 million higher than in 1953/54.

A study of the monthly freezings of spiny lobster tails in Western Australia reveals that 74.6 percent out of a total production of 1,466,975 pounds entered the freezers in the month of December 1954. It is also noted that the production of medium and large tails is at the lowest level in December.



Austria

FISH OIL AND CANNED FISH INCLUDED ON IMPORT LIST: Fish and canned fish were included on an official list of commodities that may be imported into Austria from the United States without special license. Release of this list was the first major move by the Austrian government toward liberalization of imports from the dollar area, according to reports from the United States Embassy, Vienna.

The fishery items are described in the Austrian tariff as follows: Tariff No. 76: Fish oil. Tariff No. 170 b and e: Canned fish, lobster, crabs.



Canada

BRITISH COLUMBIA SALMON PACK, 1955: The 1955 British Columbia salmon canning season ended in November with a total pack of 1,406,230 cases (48 1-lb. on

British Columbia Canned Salmon Pack, 1950-55

Species	1955	1954	1953	1952	1951	1950
	Standard Cases (48 1-lb. cans to case)					
Sockeye (Red)	244,900	680,930	510,100	449,174	428,217	408,041
Spring (King)	18,003	14,066	12,177	9,064	13,631	9,133
Steelhead	1,801	3,732	2,724	3,752	3,648	3,243
Blueback	10,541	4,302	2,055	5,581	13,224	7,371
Coho (Silver)	175,164	124,084	108,115	58,514	300,521	109,272
Pink	830,602	335,777	793,382	675,836	735,494	446,516
Chum (Keta)	125,219	580,515	392,716	91,514	460,740	498,984
Totals	1,406,320	1,743,406	1,821,269	1,293,435	1,955,475	1,462,560

cans), the Canadian Department of Fisheries reported on November 23, 1955. This was a decrease of 19.3 percent from the 1954 pack of 1,743,406 cases. The pack of pink salmon was the best in the last six years, but the increased pack of pink salmon was more than offset by a sharp drop in the packs of sockeye salmon and chum salmon.

The 1955 salmon pack was 29.1 percent below the 1951 pack of 1,955,475 cases, but the 1955 pack of pink salmon was 4.7 percent higher than the pack of pink salmon in 1951, which was also a cycle year.

BRITISH COLUMBIA SHRIMP FISHERY: Shrimp is produced commercially in Canada only in British Columbia, reports the United States Embassy at Ottawa (September 14, 1955). Landings of shrimp in that Province in 1954 amounted to 855,300 pounds, valued at C\$116,064, as against 1953 landings of 1,151,600 pounds, valued at C\$143,991. Only a small proportion of the catch is processed frozen (see table).

British Columbia's Production of Shrimp Products, 1953-54			
Product	Unit	1954	1953
Fresh	lb.	47,400	192,500
Frozen	lb.	13,700	14,200
Meats (Peeled-Deveined)	lb.	188,600	220,800
Canned	cases (48 lbs.)	646	198

Most of the shrimp is caught off the lower mainland of British Columbia and Vancouver Island, and are taken in substantial quantities in each month of the year in the southern mainland area. In Vancouver Island waters the most productive season is December to May, although some shrimp are caught during the other months as well. In 1954 a total of 80 trawl nets and 1,640 shrimp traps were employed in the shrimp fishery.

As indicated in the table, most of the shrimp landed in British Columbia is processed as fresh and frozen shrimp meats, but some shrimp is sold round in fresh and frozen forms, with some meats canned. A substantial portion of the shrimp produced in British Columbia is sold on the domestic market. The United States is the principal foreign market and small quantities are exported to some other countries.



German Federal Republic

PREFABRICATION CUTS CONSTRUCTION COSTS OF FISHING VESSELS: Prefabrication, standardization, and welding in the construction of fishing vessels makes it possible for West German shipyards to build fishing vessels cheaper than British shipyards. In recent months at least three major British fishery firms have ordered new vessels from German shipyards.

In view of the volume of work involved, a representative of *The Fishing News*, a British fishery periodical, toured most of the shipyards in Hamburg and Bremerhaven to find out why German shipyards were able to underbid British shipyards. The findings were published in the periodical's October 7 issue.

In one German shipyard, trawlers are almost 100-percent welded and it is only the largest ships which have any mechanical riveting.

But prefabrication was what fascinated the British touring representative most. He was shown prefabricated sections--a wheelhouse, a main deck, etc. Almost every part of a trawler is prefabricated and then simply assembled on the stocks by cranes. This utilizes labor more efficiently and results in savings in manhours.

And finally he believes the real answer which has enabled British owners to buy ships for so much less in Germany is standardization. This standardization leads to great economy in manhours, and thus some German yards are able to offer guaranteed delivery dates coupled with firm prices.

One famous yard has two standard designs--a German hull and an English hull (the needs of the industries in the two countries necessitate this).

German owners on the whole do not demand such fast ships as British owners. German trawlers appear to be broader in the beam than British vessels, which gives the latter a difference in speed of two to three knots.

Despite this difference it was pointed out that the German vessels have other advantages insofar as they are able to fish in weather which would debar narrower, faster vessels. Also one builder went so far as to guarantee a dry working deck for a German trawler in even the worst wind conditions.

Every trawler destined for Britain is virtually the same. The hull design is exactly the same in each case and it is only in such matters as auxiliary machinery and accommodations that they differ.

General building costs in Germany for materials, machinery, etc., are much the same as in Britain (if anything slightly higher) and it is only in the field of labor costs that money is saved.



Iceland

ICELANDIC-CZECHOSLOVAKIAN TRADE AGREEMENT, 1955/56: A new Icelandic-Czechoslovakian trade agreement was signed at Prague on September 24, 1955, covering the period September 1, 1955, to August 31, 1956. The following are the agreed Icelandic exports of fishery products to Czechoslovakia with comparative data for the previous year's agreement:

Item	Quantity		Estimated Value FOB Iceland	
	1955/56	1954/55	1955/56	1954/55
	.(Metric Tons)		...(US\$1,000)...	
Fish Fillets, frozen	8,000	6,000	2,854	2,140
Herring, salted or frozen	1,000	2,000	185	369
Fish Meal	1,000	500	154	77
Totals	10,000	8,500	3,193	2,586

In addition some exports of canned fish are included in the trade agreement.



Japan

SALMON AND CRAB FISHING FLEETS, 1956: The Japanese Fisheries Agency according to press reports has decided upon the number of salmon and crab fishing fleets to be granted permits in 1956, states a December 6 dispatch from the United States Embassy in Tokyo. The number of fleets by area for 1956 as compared to 1955 is as shown in table.

Area	Salmon		Crab	
	1956	1955	1956	1955
Aleutian Area	12	12	1	none
Okhotsk Sea	7	2	4	2
Bristol Bay	none	none	1	1
Western Bering Sea...	none	none	1	none

CRAB MEAT PRODUCTION IN NORTH PACIFIC, 1955: Japanese factoryship crab-fishing fleets in the North Pacific in 1955 produced 206,850 cases (48- $\frac{1}{2}$ -lb.

cans) of crab meat. The expedition consisted of three fleets. The Tokei Maru fleet left the fishing grounds August 17; the Yoko Maru, August 16; and the Hakuyo Maru, September 10. The first of these fleets operated in the Eastern Bering Sea, while the other two fleets operated in the Okhotsk Sea. The fleets were fishing since April 1955.

* * * * *

CANNED SALMON PACK ABOUT SOLD OUT: In spite of the fact that prospective exports of Japanese canned salmon to the United Kingdom were approximately halved by the recent Anglo-Japanese payments agreement, recent press reports state that this year's salmon pack has been almost sold out. Latest figures show that the total pack of floating and shore canneries reached an unforeseen 1,720,000 actual cases, of which 1,370,000 cases had been sold abroad by the end of October 1955. Of the remainder, 200,000 cases were packed for domestic sale, and about 50,000 cases which were packed for export failed to meet Japanese export standards and are being sold domestically. The balance available to fill foreign orders, therefore, was only about 100,000 cases, states a United States Embassy dispatch dated November 25 from Tokyo.

JAPANESE GOVERNMENT



Libya

TRIPOLITANIA TUNA INDUSTRY, 1955 FISHING SEASON: The catch of tuna during the 1955 fishing season (ended in July) in the Mediterranean Sea by seven Tripolitanian firms totaled 6,403 fish (1,350,000 pounds), according to a report from the United States Embassy at Tripoli. The average weight of the tuna was about 211 pounds each. This was the smallest tuna catch in 25 years. Prior to 1952 tuna production averaged close to 2,200,000 pounds a year, reached a total of 3,600,000 pounds in 1953, but dropped to 1,600,000 pounds in 1954. In addition to tuna, there was a catch of other fish which amounted to 200,000 pounds.

From the tuna, these firms reported a production of 712,000 pounds of canned tuna in oil and 62,000 pounds of canned tuna in brine in 1955.

The byproducts produced from the tuna canning operations and the fish other than tuna were: 38,000 pounds of salted byproducts, 19,000 pounds of tuna oil, and 65,000 pounds of fish meal for fertilizer.

The fishing areas were Zanzur, Zliten, Sidi Ben Laman, Fatima, Marsa Zuaga, Mamgub, Sabratha, Marsa Dila, and Marsa Dzeira.

Export data for tuna are not available for 1955, but it is likely that Italy continues to be the primary country of destination as in the past.



Mexico

WEST COAST SHRIMP EXPORTS GOOD FOR NOVEMBER 1955: During November 1955 excellent shrimp fishing was reported in the Gulf of Baja California. Imports of shrimp from Mexico into the customs districts of Arizona and California totaled 5,570,500 pounds--an increase of 2,066,900 pounds, or 59 percent, as compared with the imports into the same two states for November 1954. Shrimp imports through these customs districts are indicators of Mexico's west coast shrimp catch.

This development has been a boon to the shrimp industry of Mexico because the good catches came at a time when the shrimp catch in the Gulf of Mexico was poor.

The demand for shrimp in California was good during the month of November and prices quoted by importers at Los Angeles and San Diego increased about 10 cents per pound during the month.



New Zealand

LARGE SHIPMENT OF SPINY LOBSTERS TO UNITED STATES: One of the largest shipments of frozen spiny (rock) lobster tails left New Zealand October 8 on the City of Edinburgh destined for New York City. The shipment consisted of 1,200,000 pounds, made up of 60,000 cases, according to an October 10 dispatch from the United States Embassy at Wellington. Spiny lobster exports from New Zealand to the United States have been expanding rapidly, and now are one of New Zealand's chief dollar earners. There has been some question raised in Parliament as to whether the extensive fishing for spiny lobsters in the South Island as a result of the export demand will result in depletion of the natural supply. It is reported that this trade in spiny lobster tails is very profitable.



Norway

NORWEGIAN-RUSSIAN TRADE AGREEMENT SIGNED FOR THREE-YEAR PERIOD: Two trade agreements, the first covering commodity trade between Norway and Russia for a three-year period starting January 1, 1956, and the second enumerating additional amounts and commodities to be exchanged during calendar year 1956, were signed in Moscow November 15.

The three-year agreement replaced one that expired on December 31, 1954, and which was not renewed because the Russians were not prepared at the time to consummate long-term contracts. The new agreement calls for Norway annually to export to Russia fishery products as follows: 30,000 metric tons of hardened fat (presumably derived from fish oils), 50,000 metric tons of salted herring.

In addition to the basic amounts enumerated above, during calendar year 1956 Norway will deliver to Russia, among other products, 3,000 tons of hardened fat, 5,000 tons of frozen herring, and 3,000 tons of frozen fish fillets, according to a dispatch dated November 17, 1955, from the United States Embassy at Oslo.



Peru

SHRIMP AND TUNA SURVEY: Following a survey (limited as to area covered and time spent) by a shrimp specialist of the U. S. Fish and Wildlife Service, representatives of the Peruvian Division of Commercial Fisheries, and two technical advisors from the U. S. International Cooperation Administration (ICA), it was concluded that the quantity of shrimp in Northern Peruvian waters was not sufficient to support a fishery. In addition to the survey conducted October 18-22, 1955, of shrimp fishing possibilities, the fishery for tuna was studied in the same area. It was found that the recently-introduced Japanese long-line method of fishing for tuna offered considerable promise.

It was reported by ICA's Technical Advisor to Peru that only two trawlers are fishing in the area from Caleta Cruz north to the Ecuadorian border. These vessels are steel trawlers, one of which is 48 feet long and the other is 60 feet in length. The larger vessel uses a beam trawl 27 feet in width at the mouth, and the other trawler a 35-foot otter trawl.

The survey party made a trip aboard the smaller vessel and in three drags of approximately 1-hour each, about 30 pounds of jumbo shrimp ranging from 4 to 15 per pound heads off were taken. Very few commercial fish were taken along with the shrimp and fishing for the most part was in depths of from 4 to 5 fathoms.

Five species of shrimp were identified by the Service's shrimp specialist, three of which are commercial species. The commercial varieties were Penaeus occidentalis, P. stylostris, and P. van name (previously unrecorded in Peru). Two smaller species not used in the commercial fishery were identified as Xyphopenaeus sp. (sea bob), and a banded species black on white now being named and described by M. D. Burkenroad.

The northern Peru fishery for tuna, skipjack, and swordfish was not very productive at the time of the survey, due in part to rough seas and high winds which made fishing difficult. The 4 or 5 purse seiners were collecting about 20 to 30 metric tons of yellowfin and skipjack. The most promising development noted was the recently-introduced Japanese long-line which is now being used by several 28-foot and 35-foot swordfish boats, each carrying 10 to 20 baskets of 15 hooks each. The long-liners have been taking yellowfin and big-eyed tuna, swordfish, striped marlin, and various species of sharks in depths of from 15 to 50 fathoms.

Because of a lack of knowledge in operating long-line fishing gear, the production at present is not high. One of the problems is to obtain bait, as anchovies, sardines, and herring are very scarce along the northern Peruvian coast.

Considerable experimentation will be necessary to determine the best depths for fishing the long lines. Down to 20 fathoms, the sharks are very abundant along with swordfish and marlin. Yellowfin and big-eyed tuna are taken down to 50 fathoms. The big-eyed tuna are generally each over 125 pounds in weight with little commercial value. Markets for sharks and large big-eyed tuna are being sought in Europe.

Giant squid are very abundant and cause considerable loss both by stealing bait and damaging caught fish and large manta rays at times took away as much as a whole basket of line.

* * * * *

REVIEW OF FISHING INDUSTRY: About 15 years ago, fishing in Peru was on a primitive scale and there was little processing of fishery products or byproducts. Today the fishing industry is an important part of Peru's economic wealth. The present worth of Peru's fishing industry is estimated at about almost US\$20 million.

Catch: Peru's catch has increased steadily year after year from 12 million pounds in 1939 to 290 million pounds in 1954. Bonito, tuna, swordfish, and herring (machete) landings have shown a more pronounced increase over the years. Bonito is the most important species landed and is found all along the Peruvian coast, but it is seldom fished in the extreme north. Tuna and swordfish, on the other hand, are found only from Paita to the Ecuadorian border in the north and from Mollendo to Chile in the south. In the 1953/54 season, tuna was also caught for the first time in commercial quantities off Chimbote. Machete, a fish similar to herring and shad, is landed mainly in Samanco, Callao, and in Ilo.

Bonito landings during recent years have not fluctuated very much, but yellowfin tuna, skipjack tuna, and swordfish landings have fluctuated considerably. Anchovy landings have increased from 15 million pounds in 1951 to almost 78 million pounds in 1954.

Table 1 - Peru's Commercial Fisheries Landings by Principal Species, 1951-52 & 1954

Species			1954	1952	1951 ^{3/}
English Name	Peruvian Name	Scientific Name	... (Million Lbs.) ...		
Tuna, yellowfin	Atun	<i>Neothunnus macropterus</i>	6.3	9.6	14.3
Tuna, skipjack	Barrilete	<i>Katsuwonus pelamis</i>	8.9	10.1	2.9
Bonito	Bonito & Chauchilla	<i>Sarda chilensis</i>	115.1	117.3	112.5
Swordfish	Pez espada	<i>Xiphias gladius</i>	1.5	5.7	3.3
Pacific mackerel	Caballa	<i>Pneumatophorus peruanus</i>	7.8	7.3	2.5
Herring, shad	Machete	<i>Ethmidium chilcae</i>	21.4	19.5	28.3
Drum	Lorna, corrina, & robalo	<i>Sciaenidae</i> sp.	20.6	13.2	9.3
Sharks	Cazon & tollo	<i>Mustelus</i> sp. & <i>Scoliodon</i> sp.	8.5	3.4	1.7
Anchovy (except bait)	Anchoveta	<i>Engraulis ringens</i>	2/ 77.7	35.1	15.0
Others 1/			21.9	27.4	23.8
Total			289.7	248.6	213.6

1/ Some of the more important species included are: white sea bass or ayanque (*Cynoscion annalis*), grunt or cabinza (*Asacia conceptionis*), sea trout or coco (*Paralichthys peruana*), mullet or lisa (*Mugil cephalus*), pejeblanco (*Caulolatilus princeps*), silverside or pejerrey (*Austromenidia regia*), pilchard or sardina (*Sardinops sagax*), and Spanish mackerel or sierra (*Scomberomorus maculatus*).

2/ Includes 500,000 pounds of shrimp.

3/ Based on data from the Direccion de Capitanias, Bureau of Fisheries and Wildlife estimates landings at 232.2 million pounds.

Note: Based on reports of port captains to Peru's Bureau of Fisheries and Wildlife. The Bureau does not regard these data as complete. Includes landings by Peruvian-based boats regardless of whether or not they are Peruvian flag boats. Data for 1953 not available by species.

The most active fishing ports in Peru are Callao, Mancora, Ilo, Chimbote, Paíta, Talara, Huacho, Samanco, and Sechura.

Shrimp have been found near the Ecuador border and a new fishing industry, centered in Puerto Pizarro, has been developed in that area in the last few years. About

Table 2 - Peru's Commercial Fisheries Landings, 1947-1954 1/

Year	Quantity (Million Lbs.)
1954	289.7
1953	264.0
1952	248.6
1951	232.2
1950	184.0
1949	133.8
1948	104.8
1947	80.6

1/ Bureau of Fisheries and Wildlife data.

500,000 pounds of shrimp were landed in 1954. Vessels have been adapted to shrimp trawling. Shrimp are packed in insulated boxes and delivered to freezers in this form. Some shellfish other than shrimp are gathered by men ashore, and mussels are harvested by diving for them around Callao, Huacho, Pisco, and Ilo.

Vessels: Most of the fishing boats used in Peru before 1940 were open double-bowed boats. In the north, from Sechura, south of Paíta, to Moche, near Trujillo, "caballitos de totora" (long narrow rafts made of reeds) were used and are still used. However, in other areas now mostly row boats and sail boats are used to catch ground-

Processing Facilities and Production of Processed Fishery Products: Refrigeration plants are now available in Paíta, Chancay, Callao, and Ilo. These plants include freezing equipment capable of temperatures as low as -40° F. and holding rooms with temperatures of -10° F. to 0° F. These plants as well as some smaller ones in other ports have ice-making equipment. Total freezing capacity of the private land installations is about 400,000 pounds a day and their holding capacities total over 6 million pounds.

The Government has built a fishing terminal or market in Lima with a cold-storage plant which has a freezing capacity of 20,000 pounds a day and a holding ca-

Product	Quantity (1,000 pounds)										F.O.B. Value (equivalent in US\$1,000)														
	United States	Puerto Rico	Canada	United Kingdom	Netherlands	Switzerland	Chile	Panama	Canal Zone	Argentina	Others	Total	United States	Puerto Rico	Canada	United Kingdom	Netherlands	Switzerland	Chile	Panama	Canal Zone	Argentina	Others	Total	
Bonito, fresh	889	-	-	-	-	-	-	-	-	-	39	928	181	-	-	-	-	-	-	-	-	-	-	5	186
Tuna, frozen	10,959	994	-	-	-	-	-	-	-	-	-	10,957	846	63	-	-	-	-	-	-	-	-	-	-	700
Skipjack tuna, frozen	11,958	883	-	-	-	-	-	-	-	-	-	12,939	785	77	-	-	-	-	-	-	-	-	-	-	862
Swordfish, frozen	1,483	-	-	-	-	-	-	-	-	-	-	1,483	388	-	-	-	-	-	-	-	-	-	-	-	302
Canned tuna in brine	474	-	-	-	-	-	-	-	-	-	11	485	111	-	-	-	-	-	-	-	-	-	-	-	95
Canned bonito in brine	1,727	-	-	-	-	-	-	-	-	-	13	1,740	363	-	-	-	-	-	-	-	-	-	-	-	408
Canned skipjack in brine	30	-	-	-	-	-	-	-	-	-	-	30	8	-	-	-	-	-	-	-	-	-	-	-	20
Canned tuna in oil	1,030	-	-	931	180	971	-	-	151	477	3,565	3,604	-	-	581	63	210	-	-	-	33	117	807	328	
Canned bonito in oil	18,465	-	1,149	6,464	477	227	-	99	113	-	1,497	20,951	2,804	-	201	1,746	63	87	-	33	33	-	370	6,465	
Canned skipjack in oil	507	-	-	-	-	-	-	-	-	4	-	507	333	-	-	-	-	-	-	-	-	-	-	-	126
Shrimp, frozen	280	-	-	-	-	-	-	-	-	-	197	477	332	-	-	-	-	-	-	-	-	-	-	-	19
Fish oil	5	-	-	-	-	-	-	-	-	-	650	655	-	-	-	-	-	-	-	-	-	-	-	-	22
Sperm oil	5,355	-	-	-	-	-	-	-	-	-	11,039	16,394	-	-	-	-	-	-	-	-	-	-	-	-	356
Whale meal	1,138	-	-	-	-	-	-	-	-	-	286	1,424	38	-	-	-	-	-	-	-	-	-	-	-	19
Fish meal	25,113	-	-	-	-	-	-	-	-	-	30,888	56,001	-	-	-	-	-	-	-	-	-	-	-	-	814
Other	-	-	-	-	-	-	-	-	-	-	35	35	-	-	-	-	-	-	-	-	-	-	-	-	9
Total	77,689	1,916	1,149	7,915	1,015	1,198	1,270	99	113	135	9,713	102,279	7,396	135	201	1,754	192	305	111	33	33	34	871	12,117	

U.S. Equivalent in U.S. dollars computed on exchange rate of 19.89 Peruvian soles equal US\$1 (one sole equals 5.03 U.S. cents); for 1954 of 19.39 Peruvian soles equal US\$1 (one sole equals 5.16 U.S. cents); and for 1955 of 19.00 soles equal US\$1 (one sole equals 5.26 U.S. cents).

capacity of 200,000 pounds. The market also is equipped with a flake-ice machine. Besides these facilities there are a number of refrigerated vessels working for fishing companies established in Peru.

Refrigeration facilities are principally used for tuna, swordfish, and bonito, and recently for shrimp.

The frozen fish industry started to develop in 1948 when 1.5 million pounds of frozen fish were exported, almost exclusively to the United States. Frozen fish are shipped principally from Mancora, Paita, Talara, Ilo, and Chimbote.

There are at least 50 canneries in Peru which have operated at one time or another, but many of them have been inactive for several seasons or operate sporadically for only a few days each year. The most important canneries are located in

Table 4 - Peru's Exports of Marine Products and Byproducts, January-June 1955 and Annual 1953-54

Product	Quantity			F.O.B. Value 1/		
	Jan.-June 1955	12 Mos. 1954	12 Mos. 1953	Jan.-June 1955	12 Mos. 1954	12 Mos. 1953
 (1,000 lbs.) (Equiv. in US\$1,000)		
Bonito, fresh	-	928	-	-	186	-
Tuna, frozen	5,018	10,987	4,399	342	700	198
Skipjack tuna, frozen	10,964	12,920	7,441	747	862	341
Swordfish, frozen	302	1,483	1,726	60	388	302
Canned tuna in brine	84	485	486	16	113	95
Canned bonito in brine	3,321	1,740	2,722	633	366	408
Canned skipjack in brine	3	28	109	1	6	20
Canned tuna in oil	1,071	3,245	1,580	255	857	328
Canned bonito in oil	17,333	25,951	18,528	3,697	6,465	3,362
Canned skipjack in oil	86	4	101	21	1	19
Shrimp, frozen	280	507	332	94	222	126
Fish oil	5	650	440	*	26	22
Sperm oil	5,355	11,039	7,904	365	694	356
Whale meal	705	1,424	442	38	66	19
Fish meal	25,193	30,888	23,339	1,127	1,165	814
Other	-	-	35	-	-	9
Total	69,720	102,279	69,584	7,396	12,117	6,419

* Less than US\$1,000.

1/ Equivalent in U.S. dollars computed on exchange rate for 1953 of 19.89 Peruvian soles equal US\$1 (one sole equals 5.03 U.S. cents); for 1954 of 19.39 Peruvian soles equal US\$1 (one sole equals 5.16 U.S. cents); and for 1955 of 19.00 soles equal US\$1 (one sole equals 5.26 U.S. cents).

Chimbote, Samanco, Huarmey, Supe, Huacho, Chancay, Callao, Pucallana, Mollendo, and Ilo. The capacity of all canneries is about 21,000 cases (48 cans per case) a day, but canned fish production is considerably below this capacity.

Canned fish pack in 1954 amounted to 1.1 million cases (48 $\frac{1}{2}$ -lb. cans) as compared with 1 million cases in 1953 and 850,000 cases in 1951. The biggest bulk of the pack consists of bonito packed in oil. Fish is generally packed 7 ounces net contents for the solid pack, and 6 or 6 $\frac{1}{2}$ ounces net contents for grated fish, flakes, or chunk-and-flake packs. One-pound flat cans are also used for bonito and tuna, while one-pound tall cans are most often used for bonito or herring. Occasionally four-pound cans are used for institutional packs. Some small canneries pack sardines and other fish in oval cans.

Byproducts: Production of fish meal in 1954 totaled 14,040 tons and of whale meal, 647 tons. Whale oil production amounted to 769 tons and sperm oil production to 5,056 tons. While most of the fish meal was exported, practically all the fish oil was consumed locally.

Product	Quantity		C. I. F. Value 1/	
	Jan.-June 1955	12 Mos. 1954	Jan.-June 1955	12 Mos. 1954
	..(1,000 Lbs.)..		(Equiv. in US\$1,000)	
Cod and substitutes....	201	240	78	94
Sardines and similar fish	257	371	67	88
All other fishery products	251	682	85	280
Total.....	709	1,293	230	462

1/ Values of soles same as in table 4.

Production of fish meal was started on a small scale in 1945, but exportation was not initiated until 1947. Expansion has been very rapid. In 1951 fish meal production totaled only 8,000 tons. Whole herring and anchovy and tuna cannery waste are utilized for making fish meal.

Foreign Trade: In 1954 Peru's exports of marine products and byproducts totaled 102 million pounds, substantially higher than the 70 million pounds exported in 1953. On the basis of quantity, fish meal and canned fish (mostly bonito and tuna) are the most important products exported, followed by frozen tuna and frozen swordfish. From the standpoint of value, canned fish (mostly bonito and tuna) leads all other types of marine products exports.

Peru's fishery products imports are rather small--slightly more than 1 million pounds in 1954.

In 1942 fish livers and salted fish were the most important products, by weight, exported by Peru. It was in that year that canned fish was first exported. In 1944, the sudden demand for salted fish created by UNRRA made it the biggest item in Peru's exports, but this market disappeared in 1947. In the meantime, canned fish exports increased steadily.

Consumption: Estimates indicate that Peru's per capita consumption of fishery products amounts to only 6.2 pounds a year.

Whaling: Peru's whale catch in 1954 was reported as 1,650 units, compared to 1,223 units in 1953.

NEW BASE PRICE ON CANNED FISH IN OLIVE OIL FOR ASSESSMENT OF EXPORT DUTIES: In a supplement to a Supreme Resolution of November 18, 1954, which established base cost prices on canned fish for the assessment of export duties, a Supreme Resolution of September 20, 1955, fixes the following base cost prices for canned fish in olive oil, for the same tax purpose:

	Base Cost Price Peruvian Soles	Per Short Ton US\$ Equivalent
Solid pack, in 7-ounce cans	11,590.00	610
Flakes or grated, in 6.5-ounce cans	11,270.00	593
Flakes or grated, in 6-ounce cans	12,000.00	632

Thus a new classification for canned fish is established, and export declarations must contain in every case a statement as to the kind of oil used. The previous schedule established on November 1954 referred to canned fish in oil and brine, but did not make any distinction whatsoever with regard to the kind of oil.

The above table merely represents base cost prices for tax purposes and should not be taken as actual export prices, nor as the true cost of production.

The current export duty on fish is collected pursuant to Law No. 10545 establishing a 10-percent tax assessable on the difference between officially-fixed cost price at Peruvian ports and the declared f.o.b. export value. The same law prescribes the payment of an additional 10 percent tax, applicable when the export price exceeds by 25 percent the base price. These tax payments are deductible from gross income for income tax purposes.

IMPORT DUTY ON SARDINES MODIFIED: Peru, under the terms of Article XXVIII of the General Agreement on Tariff and Trade has renegotiated a number of tariff concessions previously made under the GATT by withdrawing certain items effective October 1, 1955. In compensation for these withdrawals, Peru has made additional concessions among which are reductions of 1.2 percent in the import duty on sardines. The items of the tariff on which the new concessions were granted and which are bound under the GATT are:

Tariff item 89 and 90: Sardines and substitutes therefore, prepared in oil or in tomato or other sauces. The concession rate will be 0.60 (5.26 U. S. cents) soles per gross kilogram plus 13.5 percent ad valorem applied to the c.i.f. value.



Portugal

SHRIMP PRODUCTION, 1950-54: Production of shrimp in Portugal is light, and prospects of increasing production are not good, according to official and trade sources, states a November 30, 1955, dispatch from the United States Embassy at Lisbon. Total commercial production for 1950-54 follows:

	1954	1953	1952	1951	1950
Metric Tons	31	37	39	48	57

All of the catch is consumed locally. There were no exports of shrimp in the period indicated.

NORTHERN CANNERS ORGANIZE TO PROMOTE SALES IN UNITED STATES: The northern fishcanners have organized under the name of "Copnor-Conservas De Peixe, Lda.," to promote sales (possibly under a brand name) in the United States, states a United States consular dispatch (November 23) from Oporto. Information published in the October 1955 issue of Commercial Fisheries Review stated that 30 fish cannery in Southern Portugal had also formed an organization for the same purpose.

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FISHERIES TRENDS, JULY 1955: Sardine Fishing: During July 1955 the sardine fishing was excellent both in terms of tonnage and value, states the October 1955 Conservas De Peixe, a Portuguese trade periodical. During the month, 9,811 metric tons of sardines were landed (value US\$1,278,000) as compared with landings of 6,394 tons (value US\$701,426) in July 1954. The cannery purchased 5,377 tons of the total at a cost of US\$771,895. The balance was used for local consumption. The port of Matosinhos lead all others in the landings of sardines in July, followed by Portimao and Olhao.

Other Fishing: January-July landings of other fish were: tuna 1,177 tons (ex-vessel value US\$332,000), bonito 118 tons (value US\$14,933), mackerel 3,519 tons (value US\$439,000), anchovies 2,062 tons (value US\$430,000), and chinchard 18,064 tons (value US\$1,081,000).



Spain

VIGO FISHERIES TRENDS, SEPTEMBER-OCTOBER 1955: Fishing: The fishing industry had a relatively good month in October 1955, although bonito was scarce, states a November 15 dispatch from the United States consul at Vigo. The drop in the catch of cod and the sharp drop in bonito were offset by the abundance of aguja, or needlefish, which the cannery used as a substitute for sardine for the local market. The catch of sardines (principally from Portuguese waters, according to reports) was almost 495 metric tons, by far the largest monthly catch of the year to date. Other preferred varieties were caught in fair quality.

September 1955 was also a relatively good month for the fishing industry. There was a sharp drop in the catch of bonito, which brings a good price in the local market, but there was an increase in the catch of sardines. This species continues to be scarce, which constitutes the chief worry of the fishermen and cannery since up until a few years ago it was the backbone of the industry, an October 11 dispatch reports.

Fish Canning: The fish-canning industry in October 1955, despite the lack of bonito, worked at a fair level because of the large catch of agujas, the relative abundance of jurel (*Trachurus trachurus*) and sardines. Bocarte, from which fillets of anchovies are prepared, were much scarcer than last month, only about 66 tons were caught as compared with 853 tons for September.

The canning industry during October 1955 bought 5.9 million pounds, or approximately 34 percent, of the total landings at Vigo as compared with September when they purchased 5.2 million pounds, or approximately 36 percent, of the total landings. In October 1954 they purchased 3.4 million pounds, or approximately 26 percent, of the catch.

In August 1955 purchases were 5.4 million pounds or 36 percent of the total landings; and in September 1954 purchases were 6.9 million pounds, or 42 percent of the total landings.

The fish-canning industry operated at far below capacity in September 1955. However, September can be considered a fair month, although not as good as August and considerably below September 1954. Bonito (a highly desirable variety) landings totaled only 300,000 pounds as compared to 1,400,000 pounds in July and 1,500,000 pounds in August 1955. The catch of anchovy, on the other hand, totaled almost 1,900,000 pounds as compared with July and August when none were caught. Sardines, which in past years was the principal variety canned, continued to be

scarce (only 600,000 pounds were landed). Aguja (needlefish), canned for local consumption as a substitute for sardine, were abundant.

The chronic shortage of tin plate, which has plagued the industry for some time, continued with no immediate relief in sight.



Union of South Africa

FISHERY TRENDS, FALL 1955: Signs of keener competition in some of the Union of South Africa's overseas markets for its fishery products, particularly pilchards and jack mackerel (maasbanker), are apparent, according to the Director of Fisheries. However, the reported recent development of a strong demand for canned jack mackerel in the southern United States has made up in part for the reduced exports of canned pilchard to the United States and other countries.

Landings of pilchard and jack mackerel have been seasonally variable of late and stocks of canned fish are said to be low. Prices reportedly have advanced a little as a result of the limited supplies.

Bad weather during October also hampered the fishery for spiny lobster off Cape Town, but catches now are improving and the demand for this commodity is good, states an October 31 dispatch from the United States Consulate at Cape Town.

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FISHERIES RESEARCH TO BE EXPANDED: Plans are now being made by the Division of Fisheries, Cape Town, to step up research in the Union's West Coast pilchard and jack mackerel (maasbanker) fisheries. According to the Division's director these plans include the addition of 10 new scientific positions to his division; the construction of further laboratories at the Division's research center at Sea Point, near downtown Cape Town; and the construction of 3 new research vessels, costing about US\$434,000.

The plans also include the completion of a new shore laboratory and living quarters at Stompneus, about 120 miles from Cape Town, which will cost about US\$28,000. The Stompneus laboratory is expected to be available as a substation of the Fisheries Division by the end of November 1955, a dispatch (November 4) from the United States Consulate at Cape Town states.

The research vessels are to include one of 100 feet, most probably of steel, costing about US\$238,000, and two of 75 feet, costing about US\$98,000 each, and built of wood. It is understood that all these vessels will be built in South Africa by local firms. They will be somewhat similar in design to United States fishing vessels operating off the United States Pacific coast but will be modified to fit scientific needs and the local conditions in South African fishing waters.

The capital expenditure of US\$490,000 involved in the construction of the shore laboratory and living quarters at Stompneus, the additional laboratories at Sea Point, and the three research vessels reportedly will be advanced by the Fisheries Development Corporation. It is understood that the South African Government is the sole stockholder of this corporation, which was created in 1949 by Parliamentary action.

The main object of the research work of the Fisheries Division is to put fish conservation measures in the Union on a scientific basis. The Director feels that the present measures of the South African Government limiting the annual pilchard

and jack mackerel catch to 500,000 tons a year and restricting the number of fish plants and fishing boats are arbitrary and have little scientific basis, and that the only way the Union can conserve its fisheries properly is by making a long-term study of fish species in South African waters and their environment.



U. S. S. R.

GERMAN-BUILT FACTORYSHIP TRAWLERS RAPIDLY NEARING COMPLETION: The construction of 24 factoryship trawlers was reported in the July 1955 (pp. 72-73) issue of Commercial Fisheries Review as taking place in East Germany, but actually the trawlers are being built by a shipyard in Kiel, West Germany. More details on these vessels appeared in the October 1955 (pp. 82-85) issue of the Review.



The M/V Dobrolubov, one of the 24 factoryship trawlers being built in Kiel, West Germany, for the U.S.S.R.

Of the 24 factoryship trawlers, 6 have already been delivered and others are being equipped or are on the slipways, according to a November 24 letter from the Kieler Howaldtswerke Aktiengesellschaft of Kiel which is building the trawlers. All 24 trawlers will probably be delivered by the end of 1956. The firm building the trawlers supplied the following details regarding the trawlers being built for the U.S.S.R.

In 1954 the Sudo Import Co., Moscow, placed an order for building factory trawlers with the Kieler Howaldtswerke Aktiengesellschaft; the first trawler was completed in the spring of 1955.

The fundamental idea of this novel vessel type was that the catch was to be processed and frozen on board, the incidental catch and the offal were to be used for fish meal, and the livers processed into liver oil or canned. Not only was whole fish to be frozen, but fillets were also to be mechanically prepared, packed, and frozen on the vessel.

Taking these requirements into consideration, it was determined that the processing plant should extend over the greater part of the main deck. In order to obtain a continuous flow when processing, it appeared advantageous to fish over the stern. For this purpose a slipway was fitted aft over which the net was to be hauled in.

The handling and processing of the catch is as follows: From the working deck aft on which the net is emptied, the fish are conveyed via a chute on to the factory deck situated underneath. On this chute there are several places at which the fish are eviscerated. The offal passes to the fish meal factory, whereas the livers are conveyed to a sorting table and from there go into canning preserves or liver oil. The dressed fish pass via a heading machine to the filleting machine. The fillets are then mechanically skinned and weighed into fixed-weight blocks. The blocks are placed in collection trucks and deep frozen in freezing tunnels. After the freezing process, they are glazed and mechanically packed. Conveyor belts carry the

packages to the refrigerated cargo holds where they are stored. However, it is also possible to freeze and store whole fish.

The vessels have a length of 246 feet between perpendiculars, a moulded breadth of 44 feet, a tonnage of 2,555 GRT. and 1001 NRT. A Diesel engine of 1900 B. hp. serves as a propelling unit and gives the vessel a speed of approximately 12 knots. There are about 100 men in the crew because the processing operation works two shifts.

During the trial trip of the factory trawler Puschkin in the Barents Sea, the catching gear and the factory plant have in practice worked extremely satisfactorily. It was evident that fishing over the stern is better and easier than hauling in the net over the side as is customary. The apprehensions repeatedly expressed that by hauling up on the stern slipway the fish would be squashed or the net damaged have not proved true. The factory unit has, notwithstanding that it was operated by an unskilled staff, worked very well. The required freezing capacity was even exceeded by 12 percent.



United Kingdom

BRITISH FIRMS TO MARKET HIGH-QUALITY FISH MEAL: The white-fish meal manufacturers of Hull and Grimsby, England, announce that they are pooling their resources to market a new high-quality white-fish meal, the first in the world to carry a triple guarantee of quality and purity. It will be sold under a brand name, according to the October 14 issue of The Fishing News, a British fishery periodical.

The Hull factory is the biggest producer of white fish meal in the world with an annual output of 35,000-40,000 metric tons. The Grimsby plant is the second biggest in Britain, producing 25,000-30,000 tons annually. Together the factories produce about 70 percent of the white fish meal manufactured in Britain and utilize about half the total weight of white fish landed at the two ports.

The protein content is guaranteed to be at least 66 percent; the oil content to be less than 4 percent; and the salt content to be less than 2 percent.

The chairman of the Hull company explained that both concerns were nonprofit-making companies worked on a cooperative basis. Every processor, trawler owner, fish merchant, fish curer, etc., connected with the fishing industry in the two ports is a shareholder.



Venezuela

JAPANESE BOAT TO FISH FOR TUNA: The Japanese tuna fishing boat Bozo Maru is expected to arrive in Venezuela in December 1955 to engage in tuna fishing off the island of La Blanquilla. La Blanquilla is about 100 miles north of Barcelona. The boat will be operated by Japanese for a Venezuelan-Japanese company, according to a November 8 dispatch from the United States Embassy at Caracas.

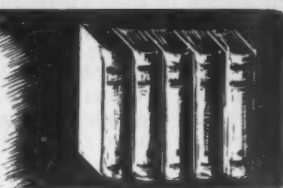
Japanese fishermen have explored the fishing grounds in the Caribbean and are believed to have found tuna in commercial quantities.

It is believed that the Japanese vessel will fish with long lines.





FEDERAL ACTIONS



Interdepartmental Committee on Trade Agreements

SUPPLEMENTAL LIST OF PRODUCTS ANNOUNCED FOR GENEVA NEGOTIATIONS:

The Interdepartmental Committee on Trade Agreements on December 11, 1955, supplemented its notice of September 21 to include a list of 34 additional products on which information is to be gathered concerning possible tariff modifications which might be offered by the United States.

The only fishery item contained in the list was fresh or frozen frogs and frog legs (Tar. Par. 1558). The import duty on this item was previously reduced to 5 percent ad valorem, the maximum permissible in the trade agreement negotiation with Japan. The listing is for the purpose of obtaining views of interested persons with respect to a possible additional binding of the 5-percent rate.

In the announcement of September 21, the United States Government had announced that it intends to participate, under the authority of the Trade Agreements Act of 1934 as amended, in multi-lateral tariff negotiations with 25 countries at Geneva beginning in January 1956.

Public hearings on the items on the supplemental list opened January 17, 1956. The U. S. Tariff Commission was scheduled to hold public hearings with respect to "peril-point" findings.



Supreme Court of the United States

RULING ON FISHERY CANNING EXEMPTION IN FAIR LABOR STANDARDS ACT:

The Supreme Court of the United States on November 14 reversed, without opinion, the decision of the 5th Circuit in Mitchell v. Myrtle Grove Packing Company and held that preliminary shucking and picking operations on a shrimp and oyster-canning line are "canning" rather than "processing" within the meaning of Section 13(a) (5) of the Fair Labor Standards Act. The effect of the decision is to deny the minimum wage exemption to most if not all preliminary processing operations on seafood in a canning plant when a substantial portion of the seafood thus processed is destined for canning.

The 1949 Amendments to the Fair Labor Standards Act deprived fish canners of their total exemption from both wages and hours, as previously accorded by section 13(a) (5), by inserting the phrase "other than canning" in the list of operations exempt from the minimum wage by that Section, and by setting up a separate overtime exemption for fish-canning operations in Section 13(b) (4). The Court of Appeals of the 5th Circuit and the Court of Appeals of the 4th Circuit have disagreed in separate decisions as to whether or not the effect of this amendment was to remove preliminary processing and handling operations in a seafood canning plant from the scope of the minimum-wage exemption.

The decision of the Supreme Court partially resolves this confusion by overruling the 5th Circuit, which had exempted the preliminary processing operations in its previously decided case of Donnelly v. Mavar Shrimp and Oyster Company, 190 F. 2d 409 (1951), and by citing with

approval the decision of the 4th Circuit in *Tobin v. Blue Channel Corp.*, 198 F. 2d 245 (1952). The latter decision relied on the continuous flow of the canning process, the intermingling of the canning process and other operations, and the fact that canning was the main objective of the operation as grounds for denying

the minimum-wage exemption to all of the preliminary processing operations.

Legal questions still remain as to the extent to which the canning operation must predominate in the over-all operation and whether total segregation of the fresh and frozen lines must be achieved before the Supreme Court decision controls.



CHESAPEAKE BAY ANCHOVIES

French-fried anchovies are among the most delicious seafood tidbits available in Tidewater, Md. In the late summer, along many Bayshore beaches, a 15-foot minnow seine will yield several quarts of anchovies within half an hour. No cleaning is necessary. Drop a handful of these



tiny fish into deep fat and in two minutes you have the most delectable morsels you can imagine. Many people eat them heads and all, but if you are finicky the heads may be easily broken off. With a side dish of french-fried potatoes, you can

have a fish fry par excellence.

An incident of interest, relating to the anchovies, occurred on August 2, 1954. As a small seine was being hauled in shallow water off Cove Point, hungry bluefish were observed to herd a large school of anchovies into water only a few inches deep. As the bluefish were feasting only a few yards out, sufficient anchovies were collected in one sweep to provide a feast that evening for eight people and, of course, the cat.

Very few people are aware of this great potential resource. The anchovies of Chesapeake Bay are of vast importance in providing food for other fish as well as food for man. This form (the most abundant being Mitchill's anchovy, *Anchoa mitchilli*) has never been seriously exploited by man in the Chesapeake region. In several European countries the anchovies are preserved like sardines, and also used in various other ways. The anchovy population of the Bay is so incredibly large that this resource may prove to be a boon if properly developed.

--Maryland Tidewater News, August 1954.

FISHERY INDICATORS

CHART 1 - FISHERY LANDINGS for SELECTED STATES

In Millions of Pounds

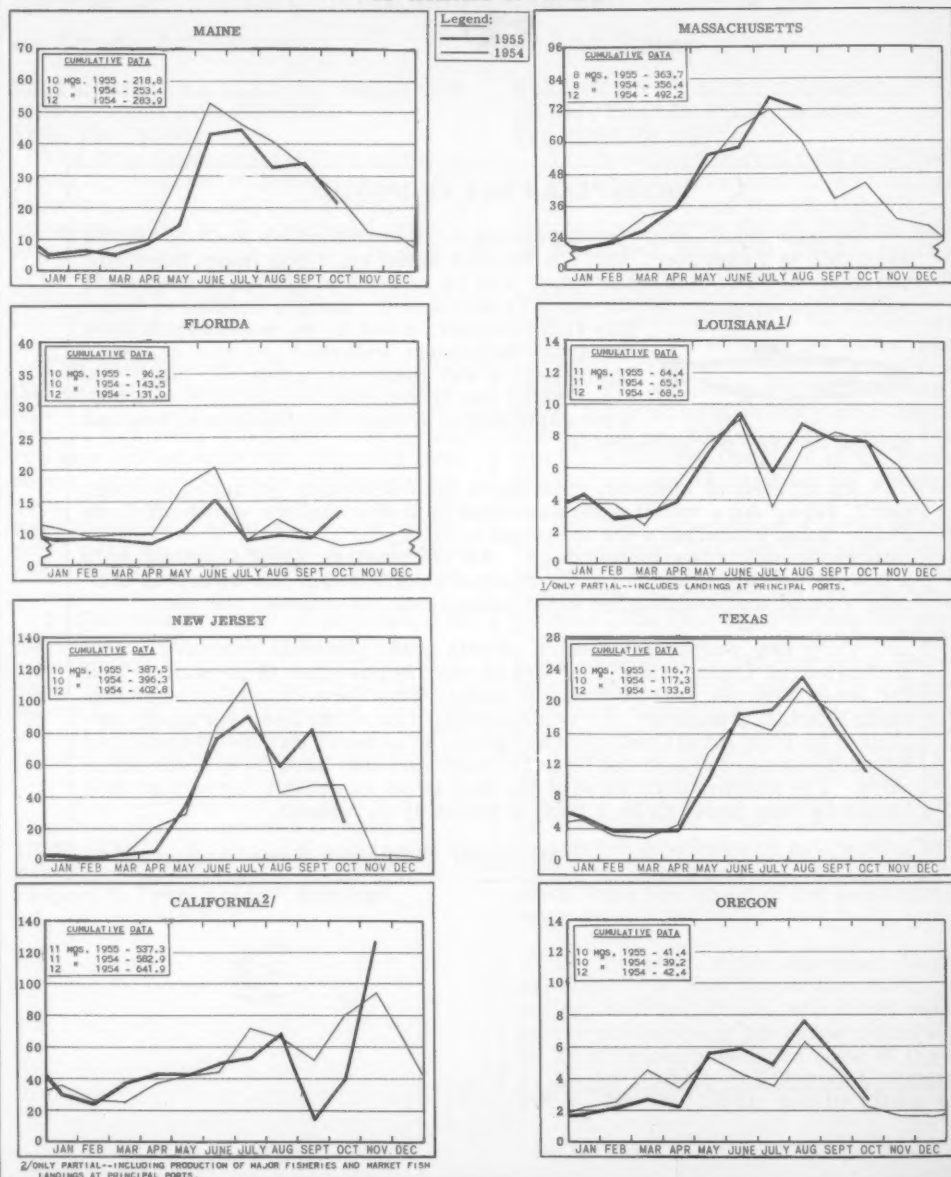
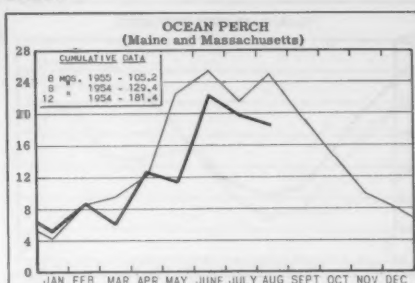
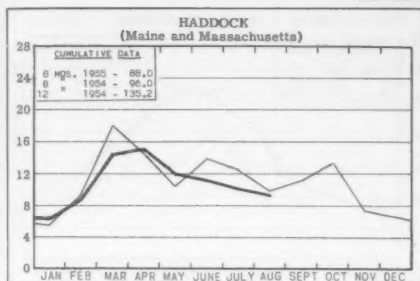
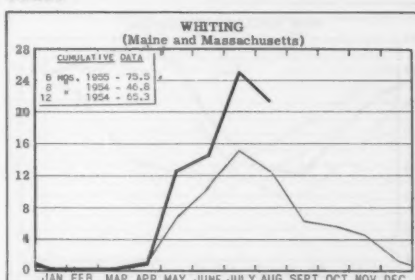
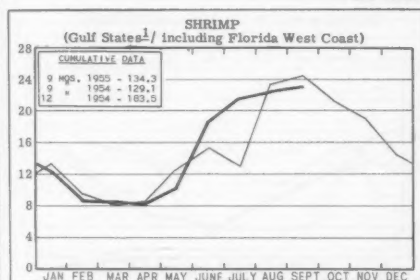


CHART 2 - LANDINGS for SELECTED FISHERIES

In Millions of Pounds

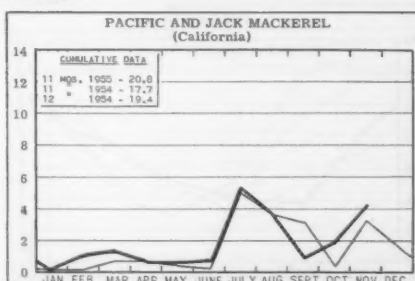
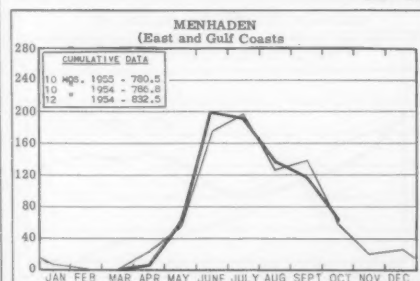


In Millions of Pounds

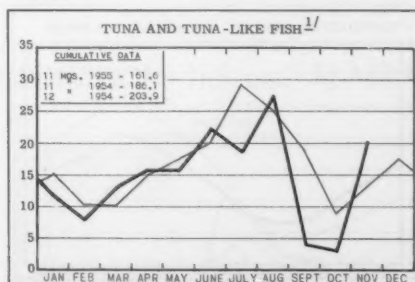
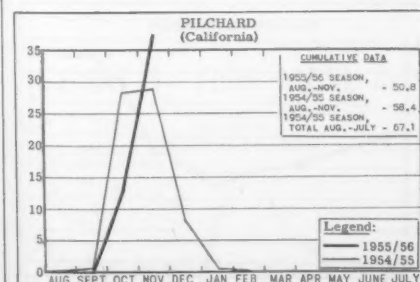


^{1/}U.S. AKA. DATA BASED ON LANDINGS AT PRINCIPAL PORTS AND ARE NOT COMPLETE.

In Thousands of Tons



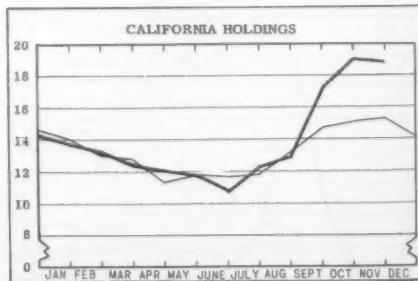
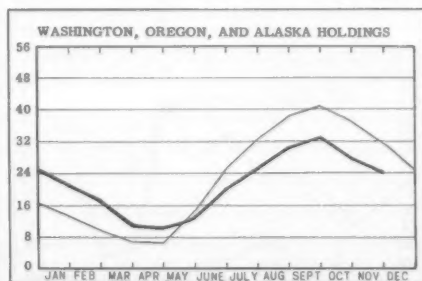
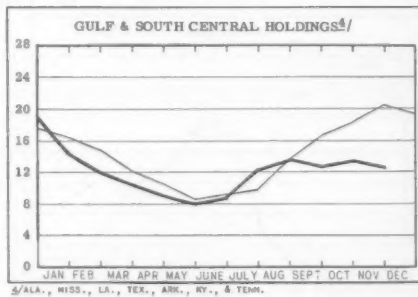
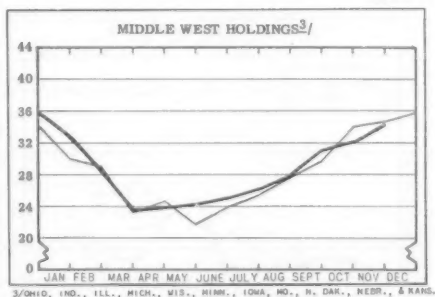
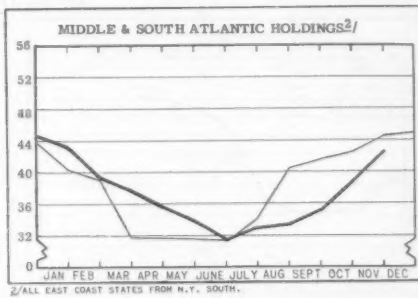
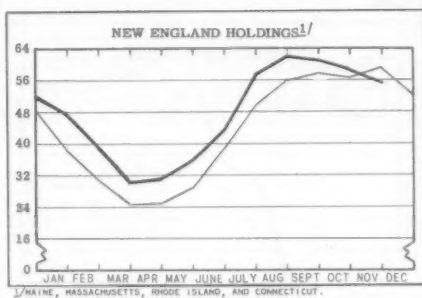
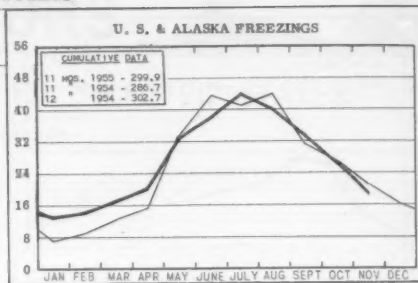
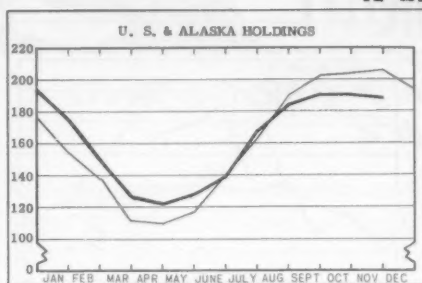
In Thousands of Tons



^{1/} RECEIPTS BY CALIFORNIA CANNERIES, INCLUDING IMPORTS.

CHART 3 - COLD-STORAGE HOLDINGS and FREEZINGS of FISHERY PRODUCTS *

In Millions of Pounds



*Excludes salted, cured, and smoked products.

CHART 4 - RECEIPTS and COLD-STORAGE HOLDINGS of FISHERY PRODUCTS at PRINCIPAL DISTRIBUTION CENTERS

In Millions of Pounds

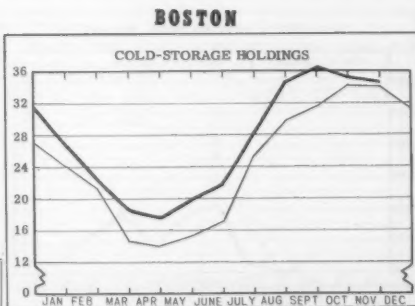
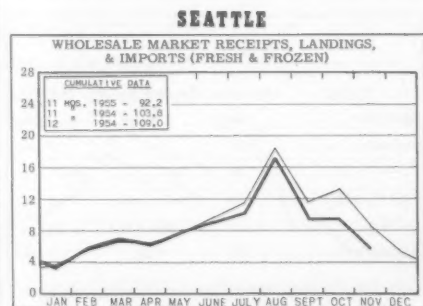
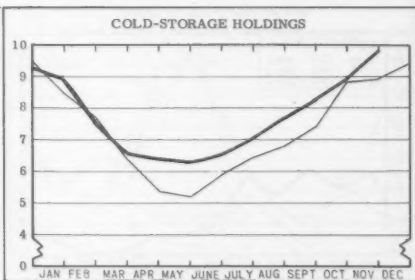
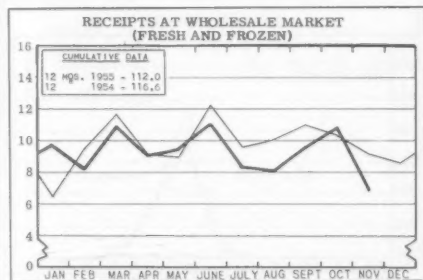
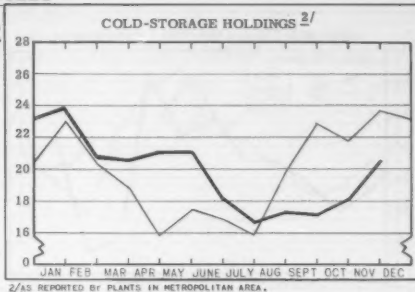
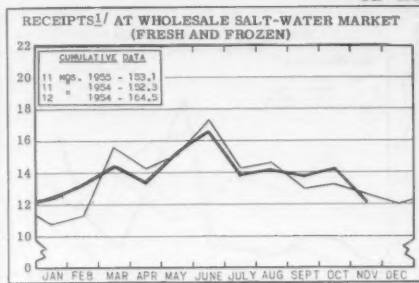


CHART 5 - FISH MEAL and OIL PRODUCTION - U.S. and ALASKA

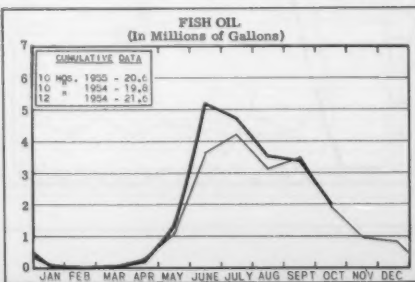
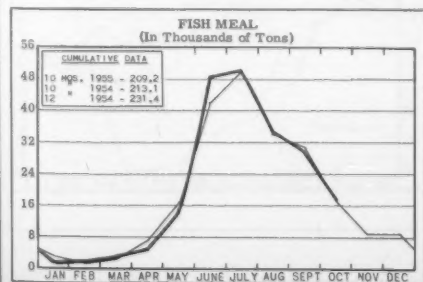
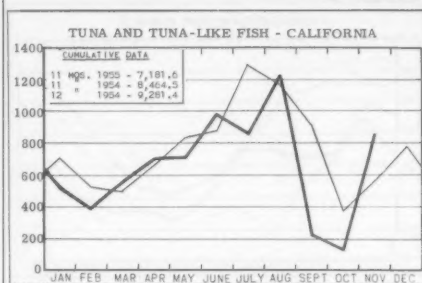
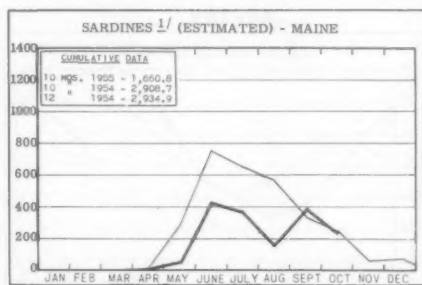
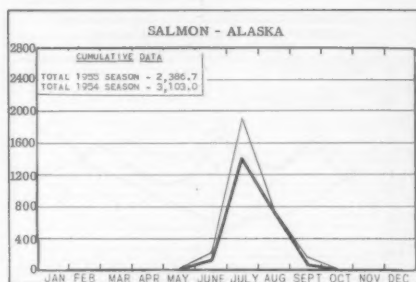
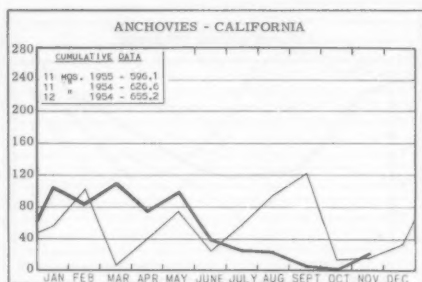
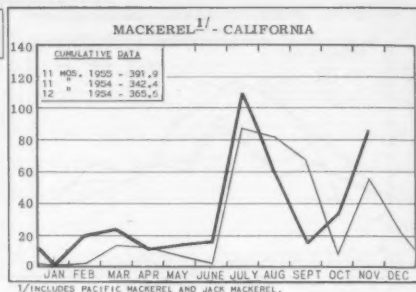


CHART 6 - CANNED PACKS of SELECTED FISHERY PRODUCTS

In Thousands of Standard Cases

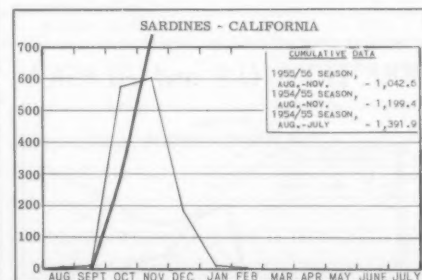


Legend:
— 1955
--- 1954



STANDARD CASES

Variety	No. Cans	Can Designation	Net Wgt.
SARDINES	100	$\frac{1}{2}$ drawn	$3\frac{1}{4}$ oz.
SHRIMP	48	--	5 oz.
TUNA	48	No. $\frac{1}{2}$ tuna	6 & 7 oz.
PILCHARDS	48	No. 1 oval	15 oz.
SALMON	48	1-pound tall	16 oz.
ANCHOVIES	48	$\frac{1}{2}$ lb.	8 oz.



Legend:
— 1955/56
--- 1954/55

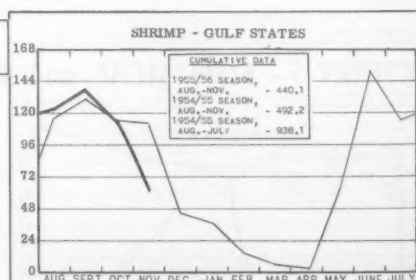
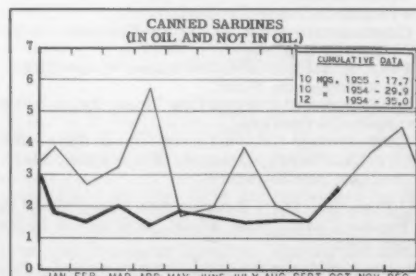
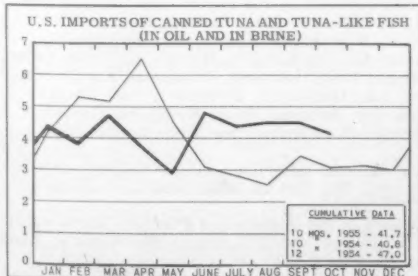
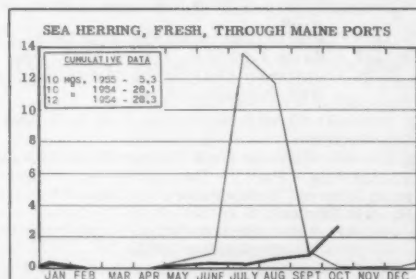
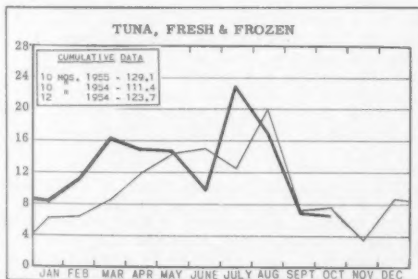
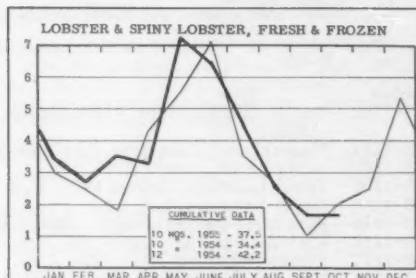
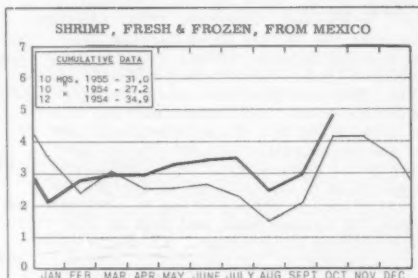
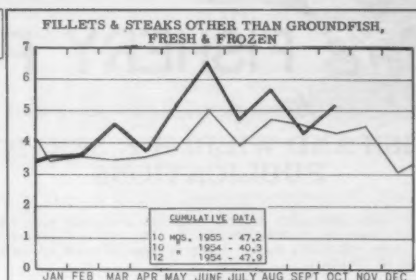
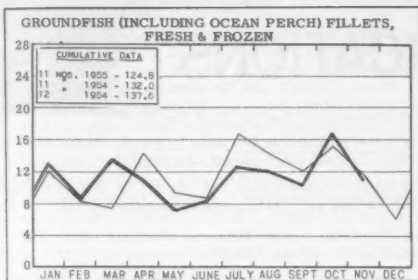
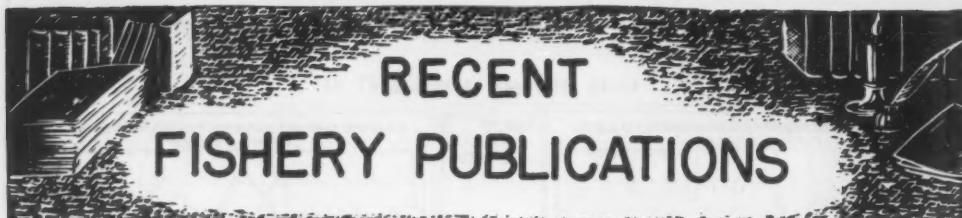


CHART 7 - U.S. FISHERY PRODUCTS IMPORTS

In Millions of Pounds





RECENT FISHERY PUBLICATIONS

FISH AND WILDLIFE SERVICE PUBLICATIONS

THESE PROCESSED PUBLICATIONS ARE AVAILABLE FREE FROM THE DIVISION OF INFORMATION, U. S. FISH AND WILDLIFE SERVICE, WASHINGTON 25, D. C. TYPES OF PUBLICATIONS ARE DESIGNATED AS FOLLOWS:

CFS - CURRENT FISHERY STATISTICS OF THE UNITED STATES AND ALASKA.
FL - FISHERY LEAFLETS.
SSR - FISH - SPECIAL SCIENTIFIC REPORTS--FISHERIES (LIMITED DISTRIBUTION).
SEP. - SEPARATES (REPRINTS) FROM COMMERCIAL FISHERIES REVIEW.

- | Number | Title |
|-------------------|---|
| CFS-1192 | - Gulf Fisheries - 1953, Annual Summary, 10 pp. |
| CFS-1198 | - Massachusetts Landings, July 1955, 5 pp. |
| CFS-1205 | - Frozen Fish, August 1955, 8 pp. |
| CFS-1209 | - Texas Landings, August 1955, 3 pp. |
| CFS-1210 | - Maine Landings, July 1955, 4 pp. |
| CFS-1211 | - Fish Meal and Oil, August 1955, 2 pp. |
| CFS-1212 | - Alabama Landings, July 1955, 2 pp. |
| CFS-1213 | - Florida Landings, July 1955, 6 pp. |
| CFS-1214 | - New Jersey Landings, August 1955, 2 pp. |
| CFS-1217 | - North Carolina Landings, August 1955, 2 pp. |
| CFS-1219 | - Mississippi Landings, July 1955, 2 pp. |
| CFS-1222 | - Maine Landings, August 1955, 4 pp. |
| FL -336z | - Quarterly Outlook for Marketing Fishery Products, 33 pp. |
| Sep. No. 419 | - Bone Detection in Fish by X-Ray Examination. |
| Sep. No. 420 | - How to Cook Frozen Fish Without Prethawing - Part I - Determination of Optimum Internal Temperature for Baked Frozen Halibut Steaks. |
| Sep. No. 421 | - Research in Service Laboratories (November 1955):
Effect of Cooking Oil Quality and Storage Conditions on the Keeping Quality of Frozen Fried Fish Sticks.
Freshness Tests for Tuna.
Commercial-Scale Freezing-Fish-at-Sea Trip Made by Delaware.
Feeding Studies with Menhaden Press Cake Pilot Reduction Plant.
Conference of Contractors Doing Research on Southern Oysters.
Cold-Storage Life of Fresh-Water Fish--No. 2 (Yellow Perch, Crappie, White Bass, Utah Chub, and Squawfish). |
| SSR-Fish. No. 161 | - Zooplankton Volumes off the Pacific Coast, 1954, 37 pp., processed, September 1955. |
| SSR-Fish. No. 163 | - Commercial Fishery for Chubs (Ciscoes) in Lake Michigan Through 1953, by Ralph Hile and Howard J. Buettner, 52 pp., illus., processed, October 1955. |

Sport Fishery Abstracts, vol. 1, no. 1, Abstracts 1-160, 46 pp., processed, July 1955.

Sport Fishery Abstracts, vol. 1, no. 2, Abstracts, 161-314, 56 pp., processed, October 1955.

THE FOLLOWING SERVICE PUBLICATION IS AVAILABLE ONLY FROM THE SPECIFIC OFFICE MENTIONED:

Gulf States Production of Fishery Products for Selected Areas, 1954, by S. C. Denham, 35 pp., illus., processed, November 1955. (Available free from the Market News Service, U. S. Fish and Wildlife Service, 609-11 Federal Bldg., New Orleans 12, La.) This report consists of two parts. The first part discusses the trends and conditions in the Gulf Coast fisheries in 1954 and gives a resume of the individual fisheries. For the shrimp fishery a detailed account is given of the general conditions, total landings, composition of the landings by species, ex-vessel prices at certain areas in Louisiana and Texas, the canned pack, and data on cold-storage freezings and holdings. Production and market conditions for the oyster, blue crab, and finfish fisheries are included in the summary, as well as the significant developments in these fisheries. The second part contains statistical tables--a monthly fishery production index for selected Gulf States areas; total landings by areas and species; total landings of selected areas by species and months; landings of fishery products by areas and species by months; crab meat production by areas and months; fishery imports through the New Orleans Customs District and Port Isabel and Brownsville, Tex.; and weekly canned oyster and shrimp packs. Tables showing the monthly range of wholesale prices of fishery products on the New Orleans French market, a summary of Gulf shrimp landings for selected areas, monthly LCL express shipments from New Orleans by months and by destination, and fishery products market classifications in the Gulf area are also included. The areas covered by the report are: Mobile and Bayou LaBatre, Ala.; Pascagoula and Biloxi, Miss.; New Orleans and Lower Mississippi River, Golden Meadow, Houma, Chauvin, Dulac, Morgan City, Berwick, Patterson, and Delcambre, La.; Galveston, Freeport, Port Lavaca, Palacios, Aransas Pass, Rockport, Corpus Christi, Port Isabel, and Brownsville, Tex.

THE FOLLOWING SERVICE PUBLICATIONS ARE FOR SALE AND ARE AVAILABLE ONLY FROM THE SUPERINTENDENT OF DOCUMENTS, WASHINGTON 25, D.C.

Check List of the Fishes and Fishlike Vertebrates of North and Middle America North of the Northern Boundary of Venezuela and Colombia, by David Starr Jordan, Barton Warren Evermann, and Howard Walton Clark, 671 pp., printed, \$3, 1955. This check list was issued originally in 1930.

Since there was no prospect of a complete revision, and because it will continue to be a valuable reference for ichthyologists and fishery conservation workers, the check list was reissued in its original form. It comprises a list of all the fishes and fishlike vertebrates known to occur in the waters of north and middle America; more specifically all of continental America north of the Isthmus of Panama, and the outlying islands including the West Indies, the Greater and lesser Antilles, Greenland, Iceland, and the islands off the Pacific coast of Central America, Mexico, the United States, and Alaska. The salt-water species on the northern coasts of Colombia and Venezuela have been included. Those of the Galapagos, the Sea of Okhotsk, and the west coast of Kamchatka are not included. The list gives (1) the names of all species and subspecies that the authors admitted as valid; (2) as many of the vernacular or common names for each species as were readily obtainable; (3) the known geographic distribution of each species; (4) the reference to the original description of the species; and (5) the reference to every real synonym.

Limnological Effects of Fertilizing Bare Lake, Alaska, by Philip R. Nelson and W. T. Edmondson, *Fishery Bulletin* 102 (From *Fishery Bulletin of the Fish and Wildlife Service*, vol 56), 25 pp., illus., printed, 20 cents, 1955.

Relative Abundance of Maryland Shad, 1944-52, by Charles H. Walburg, *Research Report* 38, 20 pp., illus., printed, 15 cents, 1955. Each year the Maryland Department of Research and Education obtains catch and effort statistics from all commercial shad fishermen in Maryland waters as part of the Maryland Management Plan. These data for the years 1944 to 1952 were used in conjunction with a tagging experiment, to estimate fishing effort, fishing rate, catch, size of run, and spawning escapement for each of these years. It was found that effort had increased almost twofold, despite the operation of a plan designed to keep it constant. The evaluation of the relation between factors which might cause changes in the size of the Maryland shad population is complicated because the effect of the Virginia shad fishery on the Maryland shad population is unknown. Without knowledge of this effect, the influence of other factors affecting the Maryland population is obscured. Before Maryland can intelligently manage her shad fishery, Virginia must establish a system of collecting catch and effort statistics. With each State collecting these statistics, the shad fishery of Chesapeake Bay could be studied as a unit to determine the best management methods.

MISCELLANEOUS PUBLICATIONS

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATIONS ISSUING THEM. CORRESPONDENCE REGARDING PUBLICATIONS THAT FOLLOW SHOULD BE ADDRESSED TO THE RESPECTIVE ORGANIZATION OR PUBLISHER MENTIONED. DATA ON PRICES, IF READILY AVAILABLE, ARE SHOWN.

"Age and Length Composition of the Sardine Catch off the Pacific Coast of the United States and Mexico in 1954-55," by Frances E. Felin, John MacGregor, Anita E. Daugherty, and Daniel J. Miller,

article, *California Fish and Game*, vol. 41, no. 4, October 1955, pp. 285-293, printed. California Department of Fish and Game, 926 J Street, Sacramento 14, Calif. This report on age and length composition of the catch of sardines (*Sardinops caerulea*) off the Pacific Coast of North America is the ninth of a series which gives similar data from 1941-42 to the present season.

The American Ephemeris and Nautical Almanac for the Year 1957, 586 pp., illus., printed, \$4.50. Nautical Almanac Office, U. S. Naval Observatory, Washington, D. C. (For sale by Superintendent of Documents, Government Printing Office, Washington 25, D. C.)

ASPERGILLUS NIGER (Sterigmatocystis (Diplomstephanus) Nigravan Tiegham, 1877) en Pesca-do Salado, Seco, by Victor H. Bertullo and Marcos Herrera C., 7 pp., printed in Spanish. (Reprinted from *Anales de la Facultad de Veterinaria*, Tomo VI, no. 2, pp. 61-66.) Universidad de la Republica, Republica Oriental del Uruguay, Montevideo, Uruguay, 1954.

"The Belugas of Hudson Bay," by James Kinloch, article, *Trade News*, vol. 8, no. 1, July 1955, pp. 3-7, illus., printed. Department of Fisheries of Canada, Ottawa, Canada. Describes the white whale, or beluga (*Delphinapterus leucus*), one of the smaller members of the whale family closely related to the dolphin and porpoise. Methods of capture are also described.

Bollettino di Pesca, Piscicoltura e Idrobiologia, Anno XXX, vol. IX (nuova serie), fasc. 2, Luglio-Dicembre 1954, pp. 139-211, illus., printed in Italian with short summaries in French and English. Laboratorio Centrale di Idrobiologia, Piazza Borghese 91, Rome, Italy, 1955. Contains, among others, the following articles: "Relazione sul' Attivita del Laboratorio Centrale di Idrobiologia durante il 1954;" "Esperimenti di Ripopolamento di Trote Mediante Scatole di Incubazione Collocate nei Corsi d'acqua;" "Missione Sperimentale di Pesca nel Cile e nel Peru - Pesci Marini Peruviani;" "Osservazioni Oceanografiche Eseguite sui Campi di Pesca dell' Alalunga delle Isole Eolie."

"Carp Cooking," by J. Almus Russel, article, *Pennsylvania Angler*, vol. 24, no. 8, August 1955, pp. 10-11, 32, illus., printed, single copy 10 cents. Pennsylvania Fish Commission, South Office Bldg., Harrisburg, Pa. Gives various methods of cooking carp: boiled (modern and century-old recipes); poached with curry cream sauce; soup; steamed with wine brown sauce; chowder; broiled; stewed; fried; scalloped with white sauce; hash; and panfried carp.

(Ceylon) Administration Report of the Acting Director of Fisheries for 1954 (Part IV--Education, Science and Art), by H. C. Gunewardena, 30 pp., printed. Government Publications Bureau, Colombo, Ceylon, July 1955. Progress reports for the year 1954 are presented by the Department of Fisheries' Administration and Socio Economic Division, Development Division, and Research Division. Among the subjects covered are: enforcement of fisheries

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regulations; cooperative development of the fisheries; loans granted to individual fishermen, unregistered fishing groups, and registered cooperative fishing societies; extension of new fishing methods and their development; mechanization of fishing craft; fresh-water fishery development; fish marketing; curing of fishery products; and manufacture of fishery by-products. Statistical data are also included on the production of fresh and cured fish, and imports and exports of fishery products and by-products.

Clam (MYA ARENARIA) Breakage in Maine, by Robert L. Dow, Dana E. Wallace and Louis N. Taxiarchis, Research Report no. 15, 2 pp., processed. Maine Department of Sea and Shore Fisheries, Augusta, Me., January 1954.

Codificación de Estadísticas Pesqueras (Codification of Fisheries Statistics), by Carlos Gonzalez, Publicacion Miscelanea No. 346, 22 pp., processed, in Spanish. Ministerio de Agricultura y Ganaderia, Buenos Aires, Argentina, 1951.

Contribution a L'etude des Especes du Genre TRACHURUS et Specialement du TRACHURUS TRACHURUS (Linne 1758), (Contribution to the Study of the Species in the Genre Trachurus and Especially of Trachurus trachurus), by R. Letacounoux, Memoires No. 15, 78 pp., illus., printed in French. Office Scientifique et Technique des Peches Maritimes, 59 Avenue Raymond-Poincare, Paris XVI, France, June 1951.

The Edge of the Sea, by Rachel Carson, 276 pp., illus., printed, \$3.95. Houghton Mifflin Co., 432 - 4th Ave., New York 16, N. Y.

Estimation of Growth and Mortality in Commercial Fish Populations, by J. A. Gulland, Fishery Investigations, Series II, vol. XVIII, no. 9, 48 pp., printed, \$1.08. British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. This paper attempts to analyze the procedure of market sampling and the subsequent analysis from a mathematical and statistical viewpoint. Part I deals with the direct sampling for length and the sampling for age distributions. Part II describes how a knowledge of the commercial landings can give a knowledge of the composition of the true natural population. Part III describes how a knowledge of this can be used to give, as far as possible, accurate and unbiased estimates of the parameters of growth and mortality of the natural population.

The Euphausiacea (Crustacea) of the North Pacific, by Brian P. Boden, Martin W. Johnson, and Edward Brinton, Contribution No. 796 (From Bulletin of the Scripps Institution of Oceanography, vol. 6, no. 8, pp. 287-400), illus., printed, \$1.50. University of California Press, Berkeley 4, Calif., 1955. As part of the Marine Life Research Program of the Scripps Institution of Oceanography (a member of the California Cooperative Oceanic Fisheries Investigations) an increased effort is being made to describe and evaluate the various organic factors that are important in the biological economy of the sea. Among the several groups of zooplankton

organisms that are being studied are the euphausiid shrimp. These highly pelagic crustaceans, popularly known as "krill," occur in large swarms in all oceans in both neritic and oceanic waters. They are considered second in importance only to the copepods as basic animal food in the sea but often exceed the copepods in mass and numbers, especially at greater depths. The present report deals with the group taxonomically on a wide geographic basis. The chief purpose of the report is to provide an essential tool with complete descriptions and illustrations to facilitate further study of the biology of the euphausiids and their relation to the pelagic community of the Pacific. Such a study is now under way, and it is believed that application of knowledge of the various species, their geographic ranges, concentrations, and reproductive areas will yield pertinent information relative to the importance of different oceanic currents and water masses in the marine ecology of our coasts. Among the marine animals that are known to feed upon the euphausiids are especially such fish as the herring and sardine, and also the whalebone whales whose diet is, despite their huge size, almost exclusively plankton. The place of euphausiids in the diet of the California sardine and other local fishes is presently under investigation in connection with the Marine Life Research program.

(FAO) Report on the First FAO-ETAP International Fish Marketing Training Centre, Hong Kong, 11 July - 31 August 1954, 161 pp., printed, \$1.50. Food and Agriculture Organization of the United Nations, Rome, Italy, September 1955. (For sale by Columbia University Press, International Documents Service, 2960 Broadway, New York 27, N. Y.) This report describes the organization and conduct of the International Training Centre and the effort to promote a closer knowledge and understanding of the particular problems in the Indo-Pacific Region. The report consists of two sections. Section I provides a factual account of the preparation and setting-up of the Centre, the conduct of the training program, the instructors and participants and, in particular, offers some observations on the problems encountered, the results already apparent, the value of International Training Centres in the Expanded Technical Assistance Program, and the urgent need for further training of this kind. Section II contains a general introduction to the fish-marketing situation in South and East Asia, a detailed description and analysis of the Hong Kong Government Fish Marketing Organization, and a series of chapters dealing with fish-marketing conditions in each of the countries (Burma, Ceylon, India, Indonesia, Japan, Malaya, Pakistan, Philippines, Thailand, and Vietnam) represented at the Centre.

"Fishing Craft Survey," article, Trade News, vol. 8, no. 1, July 1955, pp. 8-10, illus., printed. Department of Fisheries of Canada, Ottawa, Canada. A review of a comprehensive report prepared by the Markets and Economics Service of the Department of Fisheries on the economics of certain types of fishing craft operating on the Atlantic coast. This report covers

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a survey made to investigate the performance of two general types of boats, long liners and draggers, under current cost-price relationships.

Fishing Industry Research Institute, Eighth Annual Report of the Director, April 1, 1954-March 31, 1955, 43 pp., illus., printed. Fishing Industry Research Institute, Cape Town, South Africa. Includes brief accounts of the progress in the Institute's program of fisheries research. Descriptions of experimental methods and techniques are condensed and results are summarized. Attention has been given to the development of improved methods of handling and icing fresh fish, to the improvement of process control in canneries, and to questions of stickwater recovery.

Fisheries Statistics of the Philippines, 1954, by Jose R. Montilla and Crescencio R. Dimen, 75 pp., illus., processed. Department of Agriculture and Natural Resources, Bureau of Fisheries, Manila, Philippines, 1955. This report, the fourth of the series initiated in 1951, is devoted to production by commercial fishing vessels. The tables are subdivided according to gear used (with illustrations), kind of fish caught, monthly production, and fishing grounds. There are also statistics on fish-pond production, imports and exports of fishery products including canned and processed fish. Statistics also cover fishery products such as reptile skins, seaweeds, sharkfins, shells, sponges, trepang, turtle eggs, and turtle shells. The appendices contain information on the fishery districts, the forms used in collecting fishery statistics, and a new feature which is an inventory of fishing gear used in the Philippines, by kind of fisheries, and by kind, quantity, and value for the year 1953. Except for fish production which presents all available data since 1940, most of the information covers a five-year-period (1950-54). A novel feature in this issue is the incorporation of a number of statistical charts that delineate some of the important facts in the data presented.

The Fishing Industries Research Institute, 23 pp., illus., printed in English and Afrikaans. Council for Scientific and Industrial Research, Pretoria, Union of South Africa, 1954.

Fish Saving (A History of Fish Processing from Ancient to Modern Times), by Charles L. Cutting, 385 pp., illus., printed. Leonard Hill Limited, 9 Eden St., N. W. 1, London, England, 1955. The author of this book, who is trained in the field of fisheries technology, gives a very good account of the "methods evolved by man down through the ages for keeping fish in an edible condition." The contents range from the preservation practices of primitive peoples on through the pre-industrial era, the development of the vast fisheries off Newfoundland, the early history of the fish-canning industry, and on down to the present era. Although the book concentrates on the historical aspects of fish preservation as food, the volume contains many references to the role that salting, drying, and smoking of fishery products played in the development

of trade between Europe and the North American colonies. This volume is nontechnical and can be recommended to anyone who wants a background knowledge of a subject for which the material is often scattered and inaccessible. The reference material at the end of each chapter is excellent and besides a general index, is also indexed by species, names, and places.

--H. M. Bearse

Foreign Trade through San Francisco Customs District, 1954, 99 pp., illus., processed. Board of State Harbor Commissioners, Ferry Bldg., San Francisco 6, Calif. This analysis for foreign trade through the San Francisco Customs District was published as a service to world traders. Information in this issue is based on tabulations of more than 40,000 commodity items (including fish and shellfish). Summarized from these are figures on all nonmilitary cargoes exported and imported through San Francisco's Customs District in 1954.

"High-Potency Vitamin A, Oils from Indian Fresh-water Fish," by S. Balasundaram, H. R. Cama, P. R. Sundaresan, and T. N. R. Varma, article, *Nature*, vol. 176, no. 4481, September 17, 1955, pp. 554, printed. MacMillan & Co., Ltd., St. Martin's St., London, W. C. 2, England.

The Icelandic Efforts for Fisheries Conservation (Additional Memorandum Submitted to the Council of Europe by the Government of Iceland), 26 pp., illus., printed. Government of Iceland, Reykjavik, Iceland, October 1955. In September 1954 the Government of Iceland submitted a Memorandum to the Council of Europe, entitled "Icelandic Efforts for Fisheries Conservation." In May 1955 the Government of the United Kingdom submitted a Memorandum to the Council of Europe, entitled "The Dispute with Iceland" to answer the contentions of the Government of Iceland. An attempt was made in the latter publication to justify to some extent the landing ban or boycott of Icelandic trawlers which is still in effect in United Kingdom ports. In the present Additional Memorandum the Government of Iceland reviews the problems involved with reference to the United Kingdom Memorandum and in the light of current developments. It discusses the importance of the fisheries to the Icelandic people; the Icelandic fishery limits and the conservation of the fish stocks; the legal position; the economic effect of the conservation measures; and the action taken by the British fishing industry.

The Inexhaustible Sea, by Hawthorne Daniel and Francis Minot, 239 pp., illus., printed. Macdonald and Co., Ltd., London, England, 1955.

La Economía del Mar y sus Relaciones con la Alimentación de la Humanidad (The Resources of the Sea and Their Relationship to the Feeding of Man), by Zaharia Popovici and Victor Angelescu, Tomo I and Tomo II, Publicaciones de extensión cultural y didáctica no 8, 1056 pp., illus., printed in Spanish. Instituto Nacional de Investigación de las Ciencias Naturales, Buenos Aires, Argentina, 1954. This publication is divided into two volumes, Volume I has two parts: Part I--La Bioeconomía del Mar; and

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Part II--Los Recursos del Mar en la Economia del Hombre. Volume II contains Part III--Problemas de la Economia del Mar y su Vinculacion con la Alimentacion de la Humanidad.

La Pesca del Camaron en Panama. I. Evaluacion de Nuestra Riqueza Comaronera (Shrimp Fishing in Panama. I. Evaluation of Our Shrimp Resource), by M. D. Burkenroad, J. L. Obarrio, and C. A. Mendoza, 8 pp., illus., printed. (Reprinted from *Revista de Agricultura, Comercio e Industrias*, Ano. XIII, no. 21, February 1955.)

Lobos Marinos, Pinguinos y Guaneras de las Costas del Litoral Maritimo e Islas Adyacentes de la Republica Argentina, by Italo Santiago Carrara, 206 pp., illus., processed, in Spanish. Ministerio de Educacion, Universidad Nacional de La Plata, Facultad de Ciencias Veterinarias, La Plata, Argentina, 1952.

Lobster Maximus: Size Restrictions, by Robert L. Dow, 8 pp., processed. Maine Department of Sea and Shore Fisheries, Augusta, Me., March 1955.

Marine Laws--Navigation and Safety, 1955 Supplement, by Frederick K. Arzt, 106 pp., printed, \$2. Equity House, Equity Publishing Corp., Oxford, N. H., 1955. This is a supplement to the more comprehensive volume published in 1953 and reviewed in the July 1953 issue of *Commercial Fisheries Review*. The first supplement appeared in 1954 and was reviewed in the September 1954 issue of *Commercial Fisheries Review*. This new supplement brings up to date (August 2, 1955) all amendments and new marine laws enacted by Congress affecting the maritime industry. The author has carefully prepared a number of annotations covering court constructions of the Supreme Court of the United States and Subordinate tribunals on the statutes included in the main volume and this supplement. Thus, reference to any section in the supplement will instantly give the user the latest amendments and court constructions to the same section in the main volume. Several new features have been added to enhance the value of this service to its many users. A ready-reference summary of new legislation is included in the color centerfold under the heading "The Congressional Periscope."

Marine Worm Management and Conservation, by Robert L. Dow and Dana E. Wallace, Fisheries Circular no. 16, 11 pp., processed. Maine Department of Sea and Shore Fisheries, Augusta, Me., February 1955.

Maryland Board of Natural Resources, Eleventh Annual Report, 1955, 165 pp., illus., printed. Board of Natural Resources, State Office Bldg., Annapolis, Md. A report for the fiscal year beginning July 1, 1953, and ending June 30, 1954, covering the activities, accomplishments, and recommendations of the several departments represented on the Board, including the Department of Tidewater Fisheries, the Department of Game and Inland Fish, and the Department of Research and Education.

(Massachusetts) Sixth Report of Investigations of the Shellfisheries of Massachusetts, by Harry J. Turner, Jr., Contribution No. 715, 74 pp., illus., printed. Woods Hole Oceanographic Institution, Woods Hole, Mass., 1953. A summary of the investigations of methods of improving the shellfish resources of Massachusetts which were carried out in 1953 by the Woods Hole Oceanographic Institution under contract with the Division of Marine Fisheries, Massachusetts Department of Natural Resources. The following investigations are described: "The Sea Scallop Fishery," by J. Arthur Posgay; "The Edible Crab Fishery of Massachusetts;" "Growth and Survival of Soft Clams in Densely Populated Areas;" "Growth of Molluscs in Tanks;" and "A Review of the Biology of Some Commercial Molluscs of the East Coast of North America."

Meat Yield of Maine Scallops (PECTEN MAGELANICUS), by Frederick T. Baird, Jr., Research Report no. 16, 2 pp., illus., processed. Maine Department of Sea and Shore Fisheries, Augusta, Me., February 1954.

Natural Redistribution of a Quahog Population, by Robert L. Dow and Dana E. Wallace, 1 p., printed. (Reprinted from *Science*, October 7, 1955, vol. 122, no. 3171, pp. 641-642.) Maine Department of Sea and Shore Fisheries, Augusta, Me.

"New England Pioneers the Fish Stick Industry," by D. H. Cheney, article, *Foreign Trade*, vol. 104, no. 9, October 29, 1955, pp. 20-21, illus., printed, single copy 20 cents. The Queen's Printer, Government Printing Bureau, Ottawa, Canada. New England has been a leader in the development and production of fish sticks since the beginning of the industry in late 1952, and Canada has been the leading foreign source of the frozen-fish blocks and slabs from which the fish sticks are made, followed by Iceland, Norway, Denmark, and West Germany. The United States production of fish sticks, given by months for 1953-1955, shows how production has climbed steadily. A table which shows United States imports of groundfish fillets during 1954 and 1955 gives a reasonably-accurate picture of how this trade has developed. According to the author, "over 70 million pounds of fish sticks will be produced in the United States this year. Popularity of this three-year old product has boosted demand for frozen-fish blocks and slabs from Canada and this demand should continue."

"New Methods for Handling Frozen Foods in Warehouse Plants," by Theodore H. Allegri, article, *Marketing Activities*, vol. 18, no. 10, October 1955, pp. 3-7, illus., processed, single copy 15 cents. Agricultural Marketing Service, U. S. Department of Agriculture, Washington 25, D.C. (For sale by the Superintendent of Documents, Government Printing Office, Washington 25, D.C.)

"New Weapons against the Lamprey," by Woodrow Jarvis, article, *Natural History*, vol. LXV, no. 7, September 1955, pp. 364-369, illus., printed, single copy 50 cents. American Museum of Natural History, Central Park West at 79th St., New York 24, N. Y.

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The Northern Islands (Background of Territorial Problems in the Japanese Soviet Negotiations), 28 pp., illus., printed. Public Information Bureau, Ministry of Foreign Affairs, Tokyo, Japan, 1955. Against the background of the talks between Japan and the Soviet Union on the normalization of their relations, the major issues pending between the two countries have become matters of worldwide interest. Among them, of course, is the question of the northern islands. This booklet gives the background facts concerning the Kurile Islands, the Habomais and Shikotan Island, and South Sakhalin; changes brought on by the war; earlier history; negotiations on the Kuriles and Sakhalin; and economic consequences (includes a discussion of the very important role the fisheries play in Japan's economy).

Norwegian Studies on the Bacteriology of Semi-preserved Herrings, by Sverre Hjorth-Hansen, 8 pp., processed. (Reprinted from The Proceedings of the Symposium on Cured and Frozen Fish Technology, 195 pp.) Swedish Institute for Food Preservation Research, Goteborg, Sweden, November 1953.

Nota Sobre un Crustaceo Parasito del Abadejo y Merluza, by Italo Santiago Carrara, 5 pp., illus., processed, in Spanish. Catedra de Fauna Acuatica y Terrestre, Facultad de Ciencias Veterinarias, Universidad Nacional de Eva Peron, 60 y 118, Eva Peron, Argentina, April 1954.

Observaciones Sobre el Estado Actual de las Poblaciones de Pinnipedos de la Argentina, 18 pp., illus., processed, in Spanish. Facultad de C. Veterinarias, Catedra de Fauna Acuatica y Terrestre, 60 y 118, Ciudad Eva Peron, Argentina, 1954.

The Ocean Floor, by Hans Pettersson, 196 pp., illus., printed, \$3. Yale University Press, New Haven, Conn., 1954.

The Octopus, by Olive L. Earle, 64 pp., illus., printed, \$2. Wm. Morrow & Co., Inc., 425 - 4th Ave., New York 16, N. Y. A book for children principally.

"A Possible New Vitamin A, Isomer in the Eyes of Crustaceans," by Georg Lambertsen and Olaf R. Braekkan, article, *Nature*, vol. 176, no. 4481, September 17, 1955, pp. 553-554, printed. Mac Millan & Co., Ltd., St. Martin's St., London, W. C. 2, England.

(FAO) Protein Malnutrition (Proceedings of a Conference in Jamaica (1953) Sponsored Jointly by the Food and Agriculture Organization of the United Nations (F.A.O.), World Health Organization (W.H.O.), and Josiah Macy, Jr. Foundation, New York) edited by J. C. Waterlow, 289 pp., 24 plates, illus., printed. Food and Agriculture Organization of the United Nations, Rome, Italy, 1955.

PSEUDOMONAS SALINARIA, Agente Productor del "Rojo" en los Productos Pesqueros, Salados, by Victor H. Bertullo, 13 pp., illus., printed in Spanish. (Reprinted from *Anales de la Facultad de Veterinaria*, Tomo VI, No. 2, pp. 39-

50.) *Universidad de la Republica, Republica Oriental del Uruguay, Montevideo, Uruguay, 1954.*

Quarterly Report on Fisheries Research (September 1953), 9 pp., processed. The Marine Laboratory, University of Miami, Coral Gables, Fla.

Quarterly Report on Fisheries Research (September 1954), 7 pp., processed. The Marine Laboratory, University of Miami, Coral Gables, Fla.

Quantity Recipes for Institutional Food Service, 40 pp., printed. Consumer Service Division, National Canners Association, 1133 20th St., NW., Washington 6, D. C. Contains recipes (including fish and shellfish) which were developed in the National Canners Association's test kitchens and production-tested in quantity-recipe size (servings vary from 48 to 100) in an institutional food-service kitchen. A list of the common container sizes is also presented. The fish recipes included are: clam dip ambassador, codfish, appetizers, sardine canapes, party tuna balls, clam fricassee, crab meat and shrimp gourmet, salmon fondue, salmon loaf, baked shrimp and tuna newburg, oyster stuffing, and fish, noodles and mushrooms.

Recent Development in Fish-freezing Technique and Pending Scientific Problems, by Eirik Heen, 9 pp., processed. (Reprinted from The Proceedings of the Symposium on Cured and Frozen Fish Technology, 195 pp.) Swedish Institute for Food Preservation Research, Goteborg, Sweden, November 1953.

"The Relative Effectiveness of Nylon and Cotton Gill Nets," by F. M. Atton, article *The Canadian Fish Culturist*, Issue Seventeen, September 1955, pp. 18-26, illus., printed. Department of Fisheries of Canada, Ottawa, Canada. Describes a study in which nylon and cotton nets were fished under similar conditions to compare their relative effectiveness. The available literature dealing with the properties and use of nylon gill nets was examined. The following conclusions were reached: (1) Nylon gill nets were consistently more efficient than cotton gill nets in the capture of fish; (2) The greater efficiency of nylon over cotton gill nets decreased with increasing mesh size; (3) The relative efficiency of nylon to cotton gill nets was determined mainly by the availability of fish; (4) The efficiency of a nylon net may be controlled by choosing the appropriate mesh size, that is, by limiting the availability of fish to the net; (5) Nylon gill nets capture fish of somewhat larger average round weight than those caught by cotton nets of the same mesh size. This is attributed to the elasticity of this synthetic fiber; and (6) The selectivity of nylon nets compared to cotton nets varies with the species and with the availability of the size groups in a population. The main selective action of nylon nets is the capture of a greater proportion of the same group of larger fish which are caught also in cotton nets.

"Report on the United Nations Technical Conference on the Conservation of the living resources of the Sea," article, *FAO Fisheries Bulletin*,

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- vol. VIII, no. 3, July-September 1955, pp. 117-130, printed in English, French, and Spanish, single copy 30 cents. Food and Agriculture Organization of the United Nations, Rome, Italy. (For sale by International Documents Service, Columbia University Press, New York 27, N. Y.)
- Revue des Travaux de L'Institut Scientifique & Technique des Pêches Maritimes (Review of the Research by the Maritime Fisheries Scientific and Technical Institute), Tome XVIII, Fascicules 2 a 4, January 1954, 144 pp., illus., printed in French. Institut Scientifique et Technique des Pêches Maritimes, 59 Avenue Raymond-Poincaré, Paris 16, France.
- Seal Hunter, by Per Waage, 160 pp., printed, \$2.50. Coward-McCann Publishing Co., New York, N. Y. A book for the 8 to 12 age group
- Seals and Walruses, by Louis Darling, 63 pp., illus., printed, \$2. Wm. Morrow & Co., Inc., 425-4th Ave., New York 16, N. Y. A book for children principally.
- The Ship's Medicine Chest and First Aid at Sea, 498 pp., illus., printed, \$3.50. U. S. Public Health Service, Washington, D. C., 1955. (For sale by Government Printing Office, Washington 25, D. C.) A guide prepared primarily for the instruction of those responsible for the administration of emergency treatment at sea. A partial list of the table of contents includes chapters on the structure and functions of the human body, hygiene, general nursing care, first aid, and the classification and treatment of diseases. This publication provides instructions beyond first aid as continued treatment and aftercare may be necessary until the services of a physician become available. The methods and techniques are demonstrated by many illustrations, some of which are in color. This volume is reprinted with additions and changes from a volume originally issued in 1947.
- "Some Simple Oceanographical Instruments to Aid in Certain Forms of Commercial Fishing and in Various Problems of Fisheries Research," by J. N. Carruthers, article, FAO Fisheries Bulletin, vol. VIII, no. 3, July-September 1955, pp. 130-140, printed in English, French, and Spanish, Single copy 30 cents. Food and Agriculture Organization of the United Nations, Rome, Italy. (For sale by International Documents Service, Columbia University Press, New York 27, N. Y.) Describes the fishermen's current meter, warp shape indicators applicable to depth and gape studies of pelagic trawls, the fisherman's current cone, and the perspex-cased rolling clinometer.
- The South African Pilchard (SARDINOPS OCELLATA) Bird Predators, 1953-4, by D. H. Davies, Division of Fisheries Investigational Report No. 18, 32 pp., illus., printed. (Reprinted from Commerce & Industry, January 1955.) Department of Commerce and Industries, Pretoria, Union of South Africa. This paper is the fourth of a series concerned with the general biology of the South African pilchard Sardinops ocellata (Pappe), and deals with the predation of the pilchard by sea birds.
- A Study of the Oyster Biology and Hydrography at Crystal River, Florida, by C. E. Dawson, 24 pp., illus., printed. (Reprinted from the Institute of Marine Science, vol. IV, no. 1, September 1955.) Institute of Marine Science, The University of Texas, Port Aransas, Tex.
- Survival of Soft-Shell Clams, MYA ARENARIA, Buried at Various Depths, by John B. Glude, Research Bulletin No. 22, 26 pp., illus., printed. Department of Sea and Shore Fisheries, Vickery-Hill Bldg., Augusta, Me., December 1954. A report giving the results of experiments conducted on the survival of sublegal clams left by commercial digging operations. Commercial diggers leave sublegal clams buried at 1-inch to 9-inch depths in positions ranging from upright to inverted. One or both valves of some of these clams may be broken by the digging operation. Survival of these clams, which must be known to evaluate the effect of the fishery have been determined in five experiments; (1) clams with broken shells have less than one chance in a hundred of surviving; (2) the deeper clams are buried, the poorer are their chance of survival; (3) survival of clams buried in upright and horizontal positions was significantly greater than survival in an inverted position--the difference between survival in upright and horizontal positions was not statistically significant; (4) survival was better in silty-sand than in sand and poorest in silt; (5) average survival in winter was greater than in summer; (6) survival was directly proportional to the size of the clams; and (7) results of these experiments suggest the possibility of increasing production by limiting the frequency of digging and improving digging methods.
- "Torskefisket ved Vest-Grønland, 1953-54" (Cod Fishery off West Greenland, 1953/54), article Fiskets Gang; No. 35, September 1, 1955, pp. 447-453, illus., printed in Norwegian with summary in English. Fiskeridirektøren, Postgiro nr. 691 81, Bergen, Norway. Since 1953 special investigations have been carried out concerning the Norwegian fishery for cod in the waters off West Greenland. The investigations have been undertaken to meet the statistical requirements of the International Commission for the Northwest Atlantic Fisheries and are based on records returned by the fishermen on the fishing effort and yield for each day fished. For the long-liners information has been obtained on the number of sets of line, the number of hooks used, and the number of cod caught in each day, while the trawlers have stated the number and duration of each trawl haul and data on the catch in terms of number of boxes. By means of the daily catch notations the total quantity landed from each trip has been broken down by months and fishing grounds. For 1953, information was received for 34 long-liners with a catch of 6,624 metric tons of salted cod. This represented 58.5 percent of the total landings of salted cod from the 55 Norwegian long-liners fishing in West Greenland waters in 1953. The data for 1954 comprised a catch of 6,357 metric tons representing 49.5 percent of the total landings. This year information was received for 29 out of 67 long liners. For the trawlers, data comprised 92.7 percent of the

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total landings in 1953, and 87.6 percent of the total landings of trawl-caught fish in 1954.

The Underwater Naturalist, by Pierre de Latil, 275 pp., illus., printed, \$3.50. Houghton Mifflin Company, Boston, Mass., 1955. An excellent description of marine life along the coast of the Mediterranean Sea near Nice and immediate vicinity, and the observations made by underwater explorers.

Variations in Total Solids of the Soft Clam (MYA ARENARIA), by Donald M. Harriman, Research Bulletin No. 23, 14 pp., illus., printed. Department of Sea and Shore Fisheries, Vickery-Hill Bldg., Augusta, Me., December 1954. Two coastwide surveys in the State of Maine are covered in this report. Meats of soft clams, *Mya arenaria*, were assayed for total solids. Samples were taken to show geographical and seasonal variations. Surface water salinities were compared with total solids of underlying clams. In two years of study, a slight tendency to higher meat scores was observed in the Penobscot region. Variation within any given region exceeded the variation between regions however. Seasonal variations were observed, with a high in the fall and a low in the summer. Seasonal patterns were not identical for different locations, but the one location sampled for

two years was consistent in its cycle of total solids variation.

"Whose are the High Seas?" article, The Economist, vol. CLXXV, no. 5826, April 23, 1955, pp. 267-268, illus., printed, single copy 1s. (14 U. S. cents). The Economist, 22 Ryder St., St. James's, London, S. W. 1, England.

TRADE LIST

The Office of Intelligence and Services, Bureau of Foreign Commerce, U. S. Department of Commerce, Washington 25, D. C., has published the following trade list. Copies of this list may be obtained by firms in the United States from that office or from Department of Commerce field offices at \$1 a list.

Oils (Animal, Fish and Vegetable) - Importers, Dealers, Producers, Refiners, and Exporters - Japan, 22 pp. (September 1955). Because of abundant aquatic resources and a well-developed fishing industry, Japan produces large quantities of various fish oils (including whale oil), of which roughly 80 percent are exported. The list includes all the known importers, dealers, etc. in marine oils as well as other oils, at the time of publication, but is subject to change without notice.



KEEPING LIVE SHRIMP FOR BAIT

Live marine shrimp may be kept successfully in two ways: either by keeping them in submerged slat pens in ocean water or by keeping them in tanks with circulating seawater. The first situation is possible only if there is access to salt or brackish-water areas. The second method is in widespread use by many bait dealers in the coastal areas.

Shrimp may be kept successfully for several weeks if certain precautions are followed. (1) The elimination of waste products appears to be an important consideration and efforts should be made to keep refuse and decaying material from the bottom of the tanks. (2) Circulation of water is important, especially if shrimp are crowded. A flow of one or two cubic feet per minute is recommended. (3) Crowding of shrimp should be guarded against. With no circulation, three shrimp per cubic foot of water is considered optimum density. If circulation of water is available, ten shrimp per cubic foot of water appears to be a safe maximum. These figures apply to shrimp which are to be kept several weeks, and therefore the number of shrimp per cubic foot could be increased for a short period of time. Several dozen shrimp per cubic foot of water can be kept for one or two days provided that there is sufficient circulation. (4) Air supply is not important as long as water circulation is good and if there is no overcrowding. (5) It is best not to allow the temperature to rise above 80° F. (6) It is best to keep the holding tank in subdued light to reduce the growth of algae. (7) Feeding is not advised since uneaten foods tend to decay and contaminate the water. Shrimp survive well without food. (8) Sand in the bottom of the tanks permits the shrimp to bury themselves as is their custom, but it also acts as a trap for decayed material and soon develops a dark color and gives off odors. (9) In order to provide the shrimp with water of a constant salinity, it is advisable to pump from the deeper, cooler portions of the river or bays where the water is least affected by surface heating or rainfall.

--"Sea Secrets,"
The Marine Laboratory
University of Miami, Coral Gables, Fla.

CLAM CHOWDER - A POPULAR WINTER DISH



Something satisfying in the way of a savory dish, particularly during these cold wintery days, is clam chowder. When served piping hot it makes an excellent luncheon or dinner dish.

Take your choice, either the Manhattan Chowder with its tomatoes or the traditional New England style with its seasoned milk--either is delicious and will serve equally as well as soup or as a main dish.

Here are the favorite chowder recipes of the U. S. Fish and Wildlife Service's home economists.

MANHATTAN CLAM CHOWDER

- | | |
|--|------------------------------|
| 1 PINT CLAMS | 1 CUP CLAM LIQUOR & WATER |
| $\frac{1}{4}$ CUP CHOPPED BACON OR SALT PORK | 1 CUP DICED POTATOES |
| $\frac{1}{4}$ CUP CHOPPED ONION | $\frac{1}{2}$ TEASPOON THYME |
| $\frac{1}{4}$ CUP CHOPPED GREEN PEPPER | 1 TEASPOON SALT |
| 1 CUP CHOPPED CELERY | DASH CAYENNE |
| | 2 CUPS TOMATO JUICE |

DRAIN CLAMS AND SAVE LIQUOR. CHOP. FRY BACON UNTIL LIGHTLY BROWN. ADD ONION, GREEN PEPPER, AND CELERY; COOK UNTIL TENDER. ADD LIQUOR, POTATOES, SEASONINGS, AND CLAMS. COOK ABOUT 15 MINUTES OR UNTIL POTATOES ARE TENDER. ADD TOMATO JUICE; HEAT. SERVES 6.

NEW ENGLAND CLAM CHOWDER

- | | |
|--|-----------------------------|
| 1 PINT CLAMS | 1 CUP DICED POTATOES |
| $\frac{1}{4}$ CUP CHOPPED BACON OR SALT PORK | $\frac{1}{2}$ TEASPOON SALT |
| $\frac{1}{4}$ CUP CHOPPED ONION | DASH PEPPER |
| 1 CUP CLAM LIQUOR & WATER | 2 CUPS MILK |
| | PARSLEY |

DRAIN CLAMS AND SAVE LIQUOR. CHOP. FRY BACON UNTIL LIGHTLY BROWN. ADD ONION AND COOK UNTIL TENDER. ADD LIQUOR, POTATOES, SEASONINGS, AND CLAMS. COOK ABOUT 15 MINUTES OR UNTIL POTATOES ARE TENDER. ADD MILK; HEAT. GARNISH WITH CHOPPED PARSLEY SPRINKLED OVER THE TOP. SERVES 6.

Several species of clams are widely used for food (these commercially important species are but a few of the hundreds of species known). The market varieties of the East Coast are different from those of the West.

On the Atlantic coast, the marketed species are the hard clam, the soft clam, and the surf clam. The hard clam, or hard-shell clam, is commonly called quahog in New England, where "clam" generally means the soft-shell variety. In the Middle Atlantic States and southward, "clam" is the usual name for the hard clam.

Little necks and cherrystones are dealers' names for the smaller-size hard clams, generally served raw on the half shell. The larger sizes of hard clams are called chowders and are used mainly for chowders and soups. The larger sizes of soft clams are known as in-shells, and the smaller sizes as steamers.

Copies of How to Cook Clams, Test Kitchen Series No. 8, are available from Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., at 20 cents each.

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